VERTICAL INTEGRATION AND DISINTEGRATION IN A PRODUCT-SYSTEM: THE CASE OF THE PORTUGUESE PLASTIC MOULDING INDUSTRY

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VERTICAL INTEGRATION AND DISINTEGRATION IN A PRODUCT-SYSTEM: THE CASE OF THE PORTUGUESE PLASTIC MOULDING INDUSTRY

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Abstract

One may think of a plastic mould as a product-system, where each piece must be complementary to those surrounding them. In order for an ample appropriation of the benefits residing in a fully skilled but still less expensive work force, there must be a refocus on the firms core competencies, depleting the ancillary activities. The type of change each must follow is, to a great extent, function of the industrial context at place, but «…while we can expect to find capabilities and routines clustered within firms during the early stages of systematic innovation, specialisation of functions may increase as the innovation matures» (Langlois, Robertson [1995] p. 4). Given this state of events, standards gained importance and became visible as substitutes for several mould pieces. And under these contingencies, standards are considerably more than a set of technical, commercial and procedural specifications (David, Greenstein [1990]), and should be seen as an alternative way of organising the productive activities of a firm, re-defining its boundaries. The extent of their usage will determine the location of a particular governance structure in the *continuum* of possibilities that spans between organisation and market.

We intend to take the oldest Portuguese moulding firm as a case study and examine a particular set of transactions. Addressing the subject on a dynamic transaction cost approach, we propose to infer on the reasonability of the make-or-buy decision, considering the implications on the organisation, the firms' boundaries and resources, to portray its adapting nature.

Keywords: Vertical disintegration, Standardisation, Transaction costs, Capabilities

JEL Classification: L22, D23, O33

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1. Introduction and overview

In response to a business environment driven by global competition, increasing quality demands on products and technological change, a general process of institutional alteration is presenting itself on today's firms and industries, moulding them into different arrangements and shapes. The growing need most firms exhibit for flexibility in these troubled times of entrenched competition as lead some to seek for new opportunities, while others began to focus on their true line of business.

Economic analysis of business institutions, both firms and markets, is presently also facing up a revolution. The theory of the firm is seeking alternative paths to illuminate these new roads, as the established theories ceased to provide appealing and powerful explanations. The new tendency to probe today's complex organisations and the relations among them, instead of dealing with models portraying hypothetical firms, is still at motion. This departure from a formal, prescriptive model to a more thorough and detailed inspection of reality revealed the changing and variant nature of firms. As a consequence, different approaches to the subject have emerged, with distinguishing characteristics due to the unit of analysis, the availability of information or the operational environment assumed. The purpose of firms, its boundaries, the process of exchange and the mechanisms ruling them exhibit dissimilar attributes in each context.

Since the plastic moulding industry export's near 90% of total production - representing circa 250 million euros of revenues -, most of the near 250 firms labouring in the sector find themselves in an atmosphere of global competition, where each of which is trying to gain the slightest form of advantage upon their rivals. Addressing the subject on a transaction cost approach, we propose to infer on the reasonability of the make-or-buy decision, considering the implications on the organisation, the firms' boundaries and resources, to depict its mutating character.

One may think of a plastic mould as a product-system, where each piece must be complementary to those surrounding them. The complexity of both design and manufacturing process, since early conduced to a large specialisation of tasks and components which, in turn, lead to the standardisation of the later. Due to such factors as high usage of low cost labour force, reduced levels of education and a late industrialisation process, these standard components found several barriers to their adoption in the Portuguese moulding industry. Nowadays, the pressing needs of customers for reduced lead times, increased quality and product reliability is urging firms exigencies for flexibility. In order to seize the advantages of a fully skilled but still less expensive work force, there must be an emphasises on the firms core competencies, depleting the ancillary activities. Given this state of events, standards gained importance and became visible as substitutes for several mould pieces. Although their usage is generally considered as a reduction in variety, the total amount of components present in a mould and a still very large possibility of combinations create ample room for innovation.

This process of disintegrating dissimilar activities from the firms' main competencies give rise to flexibility, raises the quality standards and permits a better reallocation of resources, allowing their full employability. Alongside, the organisation of the firm evolves to a different stage, showing the volatile and adapting character of modern business institutions.

In conclusion, firms must readapt in order to cope with present times of global scale competition. The type of change each must follow is, to a great extent, function of the industrial context at place, thus leaving no space for a prescriptive model to comply. This evolving pattern on the firms' capabilities could be the solution the industry seeks for a new wave of competitiveness.

This work is structured as follows. A review of the relevant theory is exposed and the implication on the firms' boundaries of introducing standardised inputs shall be addressed in section 2. These problems are discussed in the settings of the Portuguese moulding industry taking one firm as a real case study, and the obtained results are presented in section 3. The concluding remarks are sketched in section 4.

2. Vertical disintegration of activities due to input standardisation

2.1. Transaction costs framework

Drawing from the illuminating words of Ronald Coase [1937]: «Why is not all production carried on by one big firm?», the issues of the boundaries of the firm have since marked an important field of modern economic literature. These writings not only kept its meaning, they also gained on significance, as technology and products reached the outstanding levels of complexity we could not envision even a few years ago.

The basic problem behind this reasoning sums up to selecting the best way to arrange the firm's productive activities in order to determine its efficient boundaries, and has been subtly put as a vertical (dis)integration problem. According to the transaction cost theory of the firm, there are several individual make-or-buy decisions to be made as to undertake certain activities internally or to outsource them in the market, with the purpose of attaining a perfect fit between the environment of the firm and its organisational structure (Knudsen [1995]).

Transaction costs occur fundamentally because of bounded rationality in an unpredictable environment. In general, agents cannot orchestrate complete contracts as to prevent *ex post* opportunistic behaviour. In such settings, transaction costs have a tendency to increase with market imperfections and uncertainty, and firms are inclined to internalise their transfers to counter such demeanours. The trading of specific assets, be they tangible or intangible, cannot be done through the regular markets, since partners to a trading relation may become locked into bilateral monopoly situations. As a consequence, firms internalise the transactions of inputs when production processes involve specific assets. Furthermore, one could argue that an appropriate ownership structure supports the efficient level of specific investments when contracts are incomplete (Williamson [1985], and Grossman, Hart [1986]). As the level of specificity shrinks and the number of potential trading partners expands, firms are more and more inclined to turn back to market transactions. The theory concurs on the common premise that the market is the best governance structure to deal with the recurring purchase of standard material, where alternative arrangements can readily be worked out (Williamson [1979]).

One way of establishing the best distribution of these different activities between the firm and the market, might be to distinguish according to a technical interface parameter (Williamson [1985]), implying the separation of different phases of a production process so as to determine which of these could be individually performed, from those that could not. In so doing, two sets of activities could be created: those akin to be transacted in the market and those which had to stay within the organisation.

A parallel between what has been said and the organisation of industry supported by Richardson [1972] is possible. According to his seminal work, activities requiring the same sort of capabilities are said to be *similar*, while those representing different stages of a production

process and requiring some sort of co-ordination are *complementary activities*.[1] The author concludes that the firm should exhibit a strong tendency to focus in similar activities, acquiring products with a fairly predictable aggregate demand through the market. Thus, the expanding tendency firms exhibit into increasingly dissimilar areas would be avoided, at the same time as allowing for an interactive tool of adaptation to the competitive environment.

On the one hand, the firm only has a limited ability to manage diversity[2] and there must be a rational as to what extent it should integrate more activities belonging to areas further away from the neighbourhood of its field of expertise. While, on the other, by incorporating some of these it can reduce several of the problems leading to transaction costs. As a matter of fact, these conflicting relation between efficiency and the dimension of the firm should be handled with extreme care as «…what is similar need not be what is complementary.» (Langlois and Robertson [1995] p. 15).

The balancing of these antagonistic effects on the early stages of an industry has generally lead to the internalisation of activities and to the growth of employee capabilities. As a consequence, firms have expanded their fields of expertise to related areas and the competitive advantages previously held began to deteriorate throughout an increasingly dissimilar set of competencies.

2.2. Reshaping the theory with standards

Most of the empirical literature examining the make-or-buy decision through the transaction cost lens has focused on the effects of asset specificity as the major determinant of the integration choice. According to Lyons [1995], several factors might moderate and/or accentuate the importance of asset specificity on the decision to (dis)integrate activities.

One such factor might be the usage of standardised components as inputs. As Klindleberger [1983] pointed out, standard components play an important role on the reduction of transaction costs, by minimising the possibilities for opportunistic behaviour and facilitating exchange processes between agents. The adoption of a reference standard can favour the unfolding of two paramount effects on the firms: reduce the costs of acquiring information on products, as well as limit moral hazard situations induced by asymmetric and incomplete information between agents; and, increase an industry innovative capacity, by devising informal learning procedures. Furthermore, interface standards allow for conditions of compatibility between different elements, so that it may increase market demand as well as expand consumers utility: «Ceux-ci bénéficieront ainsi d'économie sur les coûts de conversion, d'une plus grande étendue de choix sur les produits complémentaires, d'économie d'apprentissage sur les modes opératoires et d'écnomie sur les coûts de réparation et de maintenance.» (Foray [1993b] p. 36). Simultaneously, important revenue effects generated by lower transaction costs for acquiring information on product characteristics and performances may impel their demand (Farrel, Saloner [1987] and Saloner [1990]).

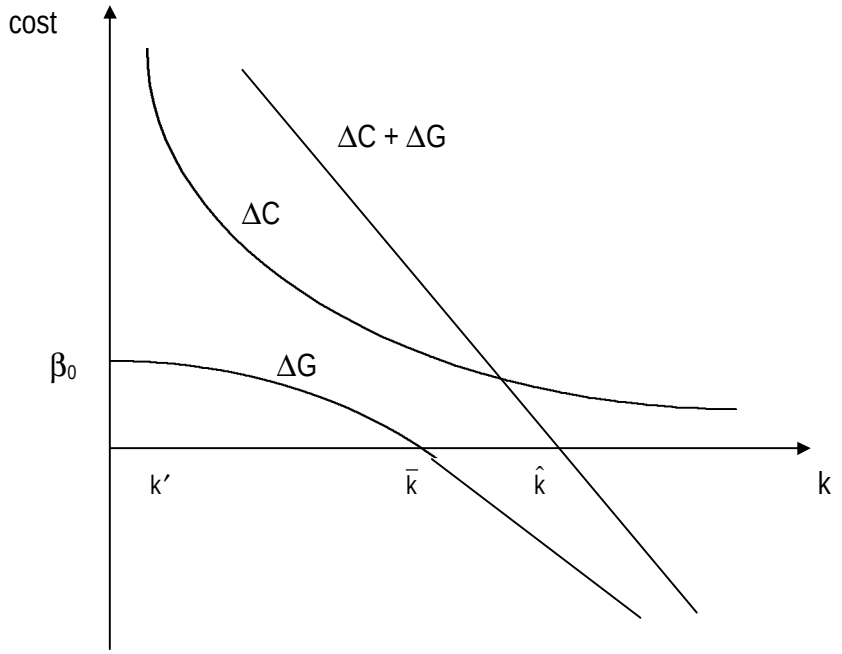
The narration of standards pro-competitive effects have extensively been done (David, Steinmueller [1994] and Foray [1993a]) and several models have elaborated on the advantages of compatibility (Matutes, Regibeau [1988], Economides [1989] and Einhorn [1992]). From a more general point of view, Williamson's interrogation «When do firms choose to procure in the

[1] Richardson explicitly points to the fact that these last set of activities needs quantitative and qualitative co-ordination, whereas Williamson leaves the qualitative aspect out of the picture.

[2] There are decreasing returns of using the management factor.

market and when do they produce to their own requirements?» ([1989] p. 150) should be re-addressed, as certain vertical integration tendencies could be refrained by the existence and usage of standards on production processes (Foray [1993b]). From a study conducted on the market for inputs, Garvey and Pitchford [1995] conclude that when facing perfect *ex ante* competition there is no incentive for ownership of the property rights of an asset, which is to say: «Competition increases the incentive for vertical dis-integration.» (*op. cit.* p. 504).

The outcome of these effects can alter the way firms have been performing their operations, and standard components can be thought of as the lever capable of adjusting the firms' capabilities to its evolving milieu. Standards assume a preponderant role in this general process of institutional and technological alteration, where the behaviour of firms is influenced by market structure.



Source: Williamson [1989]

Comparative production (ΔC) and governance (ΔG) costs as a function of asset specificity

For illustrative purposes, consider two consecutive phases of a production process where the product of the first segment is used as a factor of production of the second, for example an intermediate component. If this factor is specific or not standardised, the taking of its production internally by the second firm does not entail any over-expenditure. On the contrary, if the same component is standardised or of such a generic function that it can be used on a wide range of applications, its internalisation by the firm impedes the exploitation of both increasing returns and scope economies. Interpreting this line of reasoning on the light of Williamson's asset specificity scheme, Joly [1990] depicts the lessening of governance costs, due to market supply of standard components, and the increased advantage of internal production, in response to the diminishing specificity of these standard components.

In fact, we could follow Antonelli [1994c] by considering standards as institutions and vectors of information, capable of reducing transaction costs by: truncating the variety of asset

specification (due to a wider range of generic product application); increasing the frequency of transactions and lessening market uncertainty; and, extending the possibilities for a larger market. As so, they make possible the reduction of transaction costs, with given levels of governance costs, allowing the shortening of the governance structures and shrinking the optimum size of firms.

As a consequence, the curves on the graph are displaced to the right, increasing the market advantage to execute relations of this kind and demonstrating the limitation of the firm alternative. The shift from down to upstream standardisation enables this enlargement of hybrid alternatives, thus permitting the transit along a *continuum* of possibilities between the market and the firm. In this way, standards would act as converters of highly tacit localised knowledge into a generic, explicit technological and organisational one. According to this view-point, standards form a dynamic mechanism readily available for firms to exploit, permitting the adjusting of its internal structure to the changing conditions of the environment.

3. Case study analyses

3.1. Motivation

Given the profound character of internationalisation the Portuguese moulding industry exhibits in the national context, most firms in the sector have to overcome a series of difficulties the country's industrialisation lag poses, so as to be fit to compete with other more developed countries.

The usage of standards in the industry is, by no means, a novel situation but faced a wide series of difficulties to finding its way in. Various explanations could be advanced for that matter, but the most important ones are to be found between two closely related issues. The first one lies in the mentioned late and slow process of industrialisation, while the low levels of education and payment of human factor constitutes the other. Nevertheless, its precisely the human element which constitutes the most remarkable aspect of the industry and can account for its survival and development in such a troublesome picture. As a matter of fact, due to several particular characteristics as learning-by-doing, perfectionism, dedication and flexibility, the labour force is usually denominated as *prima donas* by those in the business.

This labour specificity can account for both the drawbacks standardised inputs encountered and for the minor interest the most important customers of the industry have always revealed for backward integration, what gave the firms in the sector enough space for extending its business to an even wider area of clients[3]. These events allowed the creation of a clientele portfolio that brought further strength to existing firms and attracted newer ones to the business. These were (and still are) predominantly established in the surroundings of the existing ones and both owners and employees come from existing firms. It turned out to be a field of enormous vitality to grow a business, where a huge amount a firms emerged at an impressive rate, reaching present day levels of approximately 250 firms essentially set up in two locations.

The development of the clientele and the ever growing needs for plastic parts and mechanisms in modern days appliances implied additional development of the workers capabilities, which are mostly composed of tacit and idiosyncratic knowledge, and obtained

[3] The moulding industry supplies an enormous range of customers, ranging from domestic appliances and toys to automobile and electronic components.

through learning-by-doing on the factory. This state of affairs augmented even more their central role on the development of the moulds, posing additional problems on the usage of standardised parts.

In the description of events just articulated, several path-dependence features are patent, denoting the endogenous character of the development of the industry and the relevance they had on its early stages. However, those qualities that enabled the industry's growth can pose severe problems to its maintenance in present state of affairs.

Nowadays, customers pose a distinct set of demands, with a focus towards quality criteria, shorter delivery times, increased reliability and eased maintenance. To cope with these dissimilar needs, firms must readapt their capabilities, especially the human component so as to efficiently employ them. In order to execute this transformation there must be a re-focus on those distinctive characteristics that adds value to the mould, eliminating the other time consuming operations carried inside the firm but which can be concurrently and efficiently acquired on the market.

As standards are a means of compressing, filtering and stocking information concerning the general processes and procedures of production, they are privileged vehicles of local tacit knowledge transfers, codifying and making explicit the characteristics of new products that command market recognition.

3.2. Governance structures analysed on a comparative basis

3.2.1. Introduction

In order to fully appreciate the extent of the impact standard components pose on this specific industry, we intend to take the oldest Portuguese moulding firm as a case study and examine a particular set of transactions. A collection of seven moulds were studied and those pieces susceptible of being standardised were replaced by standard component available for purchase in the market, process that enabled us with an illustrative assortment of transactions. It should be noted that we are only addressing a part of the relevant costs, as we can only access the cost of actually conducting the transaction. The bureaucratic costs of performing those operations in house are impossible to measure and depend, to different degrees, on the internal arrangement of the firm. Still, evaluation of the weight these auxiliary operations pose to the firm was considered, as the amount of time saved for not having to perform them entered our analysis. Additionally, the amount of time saved in project also was accounted for.

Transaction cost «…theory argues, governance analysis needs to be *comparative* in nature. (…) One simply cannot determine the merit of an organizational form by comparing it to some theoretical idea. It is only by comparing it with available institutional alternatives that a meaningful assessment can occur.» (Dosi *et. al* [1998] p. 2). Which is to say that the enterprise by itself, follows an individualistic and opportunistic perspective, trying to reach a compromise with its surroundings through static efficiency parameters. Competing in changing environments requires the ability to reconfigure basic organisational processes and systems, while achieving close co-ordination throughout complementary assets and institutional arrangements external to the firm.

On account of the cheaper labour force, we expect to find some difficulties in illustrating the benefits of employing standards to a full scale, since it may turn out to be (in some cases) more expensive to use them. Nevertheless, the price advantage of human resources is rapidly loosing pace. Some emerging economies present similar levels of payment, profiting from higher degrees

of education which, in turn, enable more flexible production schemes and shorter delivery times.[4] A reduction in the time spent on each mould is also expected, extending the possibilities for a more efficient utilisation of capabilities and allowing the attainment of scale economies. At the same time, by using compatibility standards scope economies are due to appear.

In summing up, the adoption of a given standard entails both costs[5] and benefits, and those are precisely what we expect to measure in our analyses. In fact, Antonelli [1994a,b] points to the fact that the more localised the technological change is - in terms of specific learning processes, and know-how or experience accumulation -, the higher the costs of switching to a common standard.

A maturing awareness on the part of managerial hierarchies about these circumstances, demand the need for a better employment of existing resources, while the level of both education and salaries manifests a growing tendency. Bearing this in mind, the benefits of incorporating standard components might come out to outweigh its costs. Furthermore, the possibility presented to potential customers of replacing damaged or worn out parts is farther increased with these standard components, while setting a higher quality level for the products and their performance; a price most would be willing to pay.

3.2.2. Case study

Our study proceeded as follows. After assembling a series of the most relevant moulds, a thorough study of each component was made, with the intent of determining which of these elements could have been standardised and acquired to one of the several suppliers available on the market.[6] This provided us a total amount of 189 potential transactions to perform outside the firm. The number of transactions for each mould, their years of production and the time lag between the placing of the order and the actual delivery time (in weeks) is illustrated in the next table. Even though there are several available alternative firms competing at the input market, we used standard components from a single parts supplier for an easier comparative analyses.

	DELIVERY TIME	TRANSACTIONS	YEAR
MOULD Nº 1	28	40	1992
MOULD Nº 2	36	29	1992
MOULD Nº 3	36	27	1992
MOULD Nº 4	34	25	1996
MOULD Nº 5	27	33	1997
MOULD Nº 6	29	20	1997
MOULD Nº 7	37	15	1998

After determining the exact components of each product-system that could have been standardised, we obtained their prices on the market.[7] Meanwhile, for the corresponding non

[4] Although the industry competes on a global scale, the emerging asian countries pose these specific problems.

[5] For an analyses of the switching costs involved in the adoption mechanism to a particular production process see Berg [1989].

[6] It should be noted that on each of the assessed moulds, some elements were already standard components and did not enter our evaluation. The main reasons for incorporating these pieces are customer requirements and are due to such causes as: compliance to a known performance level, allow the usage of plastic injection machines already purchased or ease the replacement of worn out parts.

[7] These compose our set of 189 transactions.

standardised pieces that had been produced in-doors, we acquired the data corresponding to their processing times and final costs of production. As our assortment of moulds corresponded to different production years, the data was up-dated to current currency values.[8]

With those figures at hand and the help of the factory employees, an evaluation of the work the standardised components already incorporated was performed, as to evaluate the corresponding cost and time savings between the pieces and the standards. Still, some of the standard components purchased in the market required some factory work to be done, and this was also taken into account.

These considerations provided us with the means to determine the differential between the cost of producing a piece on the factory and the cost of acquiring it on the spot market and adapting it to a particular usage. As the price of each standard component incorporates the information concerning its quality and it still has to endure a series of operations which (in spite of the low cost of the hourly pay) are time consuming, we expected the differential to denote an advantage of the internal cost of production. These values were registered under the variable PRODUCTION, which can be defined for each of the seven moulds in our sample as:

$$PRODUCTION = C_{INT} - C_{STD}$$

where, for every individual piece, j, that constitute the product-system under analyses we computed:

$$C_{INT} = \sum_{j} \left(M_{INT\,j} \times Q_j + H_{INT\,j} \times P \right)$$

$$C_{STD} = \sum_{j} \left(M_{STD_j} \times Q_j + H_{STD_j} \times P \right)$$

In these last two expressions, M_{INT} and M_{STD} denote the costs of the raw material or of the standardised component which replaces it, respectively; Q refers to the quantities of each element to incorporate on the mould; H_{INT} and H_{STD} represent, respectively, the hours of labour to produce a specific item or to adapt the corresponding standard to the mould where it will be included; and P stands for the hourly pay of the work force.

As the time spent on the non standardised pieces was also collected, a comparison between these and the time necessary to transform each standard component to the same requirement levels was made. The value of this attribute is expected to express a disadvantage of total internal production, as there will always be time liberated for not having to perform certain operations and several standardised components will not require any kind of adaptation (we depict this variable by PROD_HOUR (h) and PROD_HOUR).

$$PROD\_HOUR = \sum_{j} H_{INT\,j} - \sum_{j} H_{STD_j}$$

Finally, an estimate on the amount of time saved on the mould project - if it were made with standard components, instead of designing each piece from scratch - was elaborated. For

[8] All values are expressed in euros.

evaluating this parameter the help of the designers was determinant, as they posses the experience of both designing parts conforming to specific mould requirements and recovering their drawings from existing software applications. [9] This value is indicate by PRJCT_H (h) and PROJECT.

We illustrate the obtained results in the following table:

	PRODUCTION	PROD_HOUR (h)	PROD_HOUR	PRJCT_H (h)	PROJECT
MOULD Nº 1	- 977,84	139,5	4.505,45	45	897,84
MOULD Nº 2	- 1.259,46	98	3.165,12	30	598,56
MOULD Nº 3	- 1.199,98	92,5	2.987,49	37,5	748,20
MOULD Nº 4	- 1.534,28	85	2.745,26	35	698,32
MOULD Nº 5	- 3.411,31	162	5.232,14	45	897,84
MOULD Nº 6	- 1.115,94	114,5	3.698,03	25	498,80
MOULD Nº 7	- 1.122,10	32,5	1.049,66	20	399,04

CURRENCY: euros
TIME: hours

As an abridgement, and including the total cost of production for each of the product-systems studied, we can assess the net saving obtained and the amount of time liberated with the introduction of standard components as inputs of the moulds. The following calculations were also performed:

TOTAL SAVING = PRODUCTION + PROD_HOUR + PROJECT

TOTAL SAVING (%) = TOTAL SAVING/PRODUCTION COST

TIME SAVING (h) = PROD_HOUR + PRJCT_H

	PRODUCTION COST	TOTAL SAVING	TOTAL SAVING (%)	TIME SAVING (h)
MOULD Nº 1	19.278,50	4.425,45	23%	184,5
MOULD Nº 2	28.326,70	2.504,21	9%	128
MOULD Nº 3	24.600,70	2.535,70	10%	130
MOULD Nº 4	10.250,30	1.909,30	19%	120
MOULD Nº 5	61.357,10	2.718,67	4%	207
MOULD Nº 6	24.939,90	3.080,89	12%	139,5
MOULD Nº 7	18.231	326,60	2%	52,5

CURRENCY: euros
TIME: hours

It is interesting to note that mould number 1, being the oldest and the one with more potential pieces to standardise (40), is also the one that enables the greatest level of saving. On the other

[9] We should point out that every mould is designed using CAD/CAM systems, and that most (if not all) standard suppliers provide specific software with detailed information/drawing of all available components.

hand, the last mould of the set only allows a saving of 2% on the total cost of production and an utilisation of just 15 standards. The main reason for this to have occurred is surely connected to the fact that the firm had a great amount of orders to be delivered on that particular year. In fact, we followed the project of this mould since its beginning and the first draft we had access to, already contained an appreciable and unusual amount of standards, which illustrates the recognition of the relieving effect performed by standards.

All other results show a regular pattern, except mould number 5, which only entitles a saving of 4% on total cost, although being fairly recent and enabling 33 substitutions of components. As this mould was of huge dimensions and we could almost unequivocally assert it is not comparable with the others. In reality, certain doubts crossed our minds in regard to its inclusion on this set; however, it should be noted that it also is the one that could save the greatest amount of hours with the introduction of the standardised components - the lead time would diminished 5 weeks, reducing the delivery time from 27 to 22 weeks.

Comparing the cost of production and the savings obtained by the liberated work force, one can observe that the values concerning the later mostly outweigh those of the former (exception be made for mould number seven for the reasons exposed above). Which is to say that, even thought standard components are, on average, more expensive than their analogous non standardised pieces, the amount of time their usage releases neutralises this over expenditure in material requirements. Besides, one should be aware of the increasing tendency on employees' income, so that this difference will almost certainly erode over time. Within this reasoning, the time spared on the drawing board is always a net gain one can benefit from the utilisation of standardised components.[10] These findings are in accordance with transferring standardisation procedures from downstream to upstream, i.e., the extensive usage of standard components since the early stages of the design phase when the mould is only a blueprint discloses a high degree of flexibility for firms.

This is one important point to stress, as the diminishing of the time spent on each mould will release the human factor to other tasks. In this way, firms can increase the volume of production, focusing the time saved on the fulfilment of similar activities. That is, by freeing time that was being misused in ancillary activities, firms may concentrate on their core competencies and regain the advantages residing in a skilful work force, thus shaping their governance structures according to their requirement.

From what was revealed above we have a more clear cognisance of the importance standards play at the real factory arena. Unfortunately, it is apparent that the advantages of employing standards on mould production have only been used «when the going gets tough…».

4. Concluding remarks

The development of this work was carried out after a series of interviews held with representatives of the plastic moulding industry. In those meetings, the management greatest concern was directed towards the necessity of increased flexibility. Simultaneously, the developing awareness of the tendency to higher levels of employee wages compels them to a more efficient use of the human capital, depleting time consuming activities that do not increase product value.

[10] Thus corroborating the process throughout which it was possible to carry out an abnormal number of orders on 1998.

Since standards have extensively been used in the industry, one wondered why weren't they also intensely applied. Therefore, some study had to be conducted in order to capture the costs and benefits of their applicability. Our main objective was to depict the kind of changes these devices could accomplish on the structure of the firm, thus enabling an adaptation mechanism to different external environmental settings.

The investigation we envisioned follows a comparative perspective between two different production possibilities, with the aim of contrasting the efficiency levels on a cost/time saving basis. Our study was realised as to equate internal costs of production for specific pieces, against spot market prices of usable standardised elements. The acquired results point to the advantages these components bring to an organisation, augmenting its flexibility and permitting a dynamic gadget that moulds its internal structure to an ever changing medium. Furthermore, it highlights the benefits of using these standard components as inputs of the production process, instead of making them internally, as a form of refocusing the nuclear capabilities of the firm.

Under these contingencies, standards are considerably more than a set of technical, commercial and procedural specifications (David, Greenstein [1990]), and should be seen as an alternative way of organising the productive activities of a firm, re-defining its boundaries. The extent of their usage will determine the location of a particular governance structure in the *continuum* of possibilities that spans between organisation and market.

It is our firmest believe that the final part of the saying we left in the last section should be «…standards help firms keep on going.».

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