

Development of Value Stream Mapping from L'Oreal's Artwork Process

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Abstract

This research develops value stream mapping (VSM) for L'Oreal's artwork process, to eliminate waste, reduce lead-time, and identify stages that should be automated, which makes the process less prone to human error and more responsive to fulfilling B2B (B2B) customer requirements. Additionally, amendments frequently occur slowing down the artwork process. In this context, VSM is applied to L'Oreal's artwork process to reduce lead-time, human error, and missed deadlines. This practitioner note uses data from L'Oreal's artwork tracker from 2018 to 2019, which is manually tracked by the launch team. The service level agreement and task time data has been collected from 12 employees representing the launch, factory, and marketing teams working on the artwork process. Qualitative feedback was also obtained from nine employees to validate the VSM for L'Oreal's artwork process. VSM identified stages that should be streamlined and automated in L'Oreal's artwork process, which makes the process more efficient and responsive to the changing scope of the artworks. Fifty percent of the stages have been eliminated from the manual artwork process, resulting in a reduced lead-time of 10.5 days and a reduction of 28% time spent on the process. This allows the artwork process to be more agile to the requirements of B2B customers. Moreover, the proposed VSM shows a 73% increase in value added time for a renovation and a 75% increase in value added time for new product developments (NPD). VSM has been used within many functions in a business, such as operations and supply chain management, however, its application within marketing has not been extensively explored. This practitioner note attempts to fill this gap by applying VSM to L'Oreal's artwork process (AP). Moreover, this research extends the understanding of the concept and application of VSM within the context of lean in a marketing process. VSM has successfully identified the inefficiencies in the artwork process and highlighted the stages in the process that should be removed or automated thereby, making the process responsive and agile to meet the changing requirements of B2B customers. VSM has been successfully applied to L'Oreal's artwork process that resulted in a significant reduction in the total number of stages in the proposed process by eliminating non-value added activities. Efficiency gained through the application of VSM will lead to increased B2B customer satisfaction, reduced lead-time, and reduction in human errors and missed deadlines. VSM has been specifically designed, developed, and analyzed for L'Oreal's artwork process, in order to make the process more efficient and responsive to B2B customers' requirements.

KEYWORDS: VSM; lean tools; artwork- process; L'Oreal; automation

Introduction

Reducing waste and eliminating non-value added work from processes has become increasingly important in organizations, to succeed in a competitive business environment. Value stream mapping (VSM) is a lean tool that identifies non-value added work in a process and has been applied in a complex production line. If non-value added work is eliminated, processes will become more efficient and customer-focused, this enables organizations to be more responsive in fulfilling B2B customers' requirements effectively. VSM also enables processes to be more agile as valuable time is freed up to respond to changes, making the process more flexible. VSM has been used within many functions in a business, such as operations and supply chain management, however, its application within marketing has not been extensively explored. This practitioner note attempts to fill this gap by applying VSM to L'Oreal's artwork process (AP) to meet the changing requirements of B2B customers. The artwork process (AP) at L'Oreal is used to create labels for products in the consumer products division. A product can be defined as a core physical good that drives the dominant value creation and value capture of a business (Bindroo et al. 2020). These are created in 12 countries across Europe for language-specific artworks. This practitioner note is going to focus on the artworks created in the UK. However, it is anticipated that this research should be applied and integrated across the countries in Europe. Artworks are shared with functions in Launch, marketing, the suppliers, legal and scientific, and TAG via e-mail. TAG is an external company that creates the editable files. The current process has insurmountable room for human error, work duplication, and no visibility on the status of the artworks, which causes increased costs, missed deadlines, and delays in production. VSM has the capabilities to identify specific non-value added work in L'Oreal's AP, if eliminated this would help to reduce the lead-times and the number of missed deadlines.

Literature review

The concept of lean was first introduced in 1978, in Japan by Ohno and Shingo, who emphasized the maximization of resources and elimination of waste (Al Hroub et al. 2019; Vinodh, Somanaathan, and Arvind 2013). Additionally, James Womack led the benchmark study of lean manufacturing on the Toyota Production System in the 1980s (Solaimani, Talab, and Rhee 2019). As a result, he produced a best set of practices, which was termed as Lean Management (cited in Solaimani, Talab, and Rhee 2019). These practices were developed to improve quality and productivity (Jacobs and Chase 2017). Today lean techniques and manufacturing are being implemented globally in a variety of industries and sectors (Kale and Parikh 2019). Al Hroub et al. (2019) define lean management as: "the techniques and tools utilized to eliminate and reduce the waste in a process while improving the productivity and effectiveness in the workflow". L'Oreal should develop a lean process to gain a competitive advantage in the B2B market place (Scott, Stone, and Fae 2016). In summary, this literature review aims to evaluate the suitability of lean tools, specifically "stream mapping (VSM) as a tool that should be used to identify where improvements need be made in L'Oreal's AP. Furthermore, agile theory will be discussed in order to find the optimal AP that is efficient from the application of lean concepts yet responsive to the needs of the B2B customers.

Value stream mapping and its application to L'Oreal's AP

A lean tool frequently used in process improvement is value-stream mapping (VSM) (Dadashneiad and Valmohammadi 2018). "Value stream mapping is a graphical way to analyze where value is or is not being added as material flows through a process" (Jacobs and Chase 2017). VSM looks at the current process and develops a 'current state map', which visually demonstrates how a process works, through identifying data and communication flows (Dinis-Carvalho et al. 2019; Kale and Parikh 2019). The way information flows in this map is what differentiates VSM from other tools (Kale and Parikh 2019). The VSM splits the activities into three sections; value-adding, non-value adding, and necessary non-value-adding. The goal is to eliminate all of the non-value adding activities and to optimize the value adding activities (Hines and Rich 1997; Jacobs and Chase 2017; Kale and Parikh 2019). According to Singh et al. (2019), eliminating non-value activities helps organizations to provide quality that satisfies the demands of B2B customers. VSM has not been explored and applied to a marketing process such as L'Oreal's AP; however, Solaimani, Talab, and Rhee (2019) conclude that VSM can be applied to any business activity and can be expanded upstream or downstream. Hines et al. (1998) state that the removal of waste in a supply chain setting is perhaps the most important task. Russell and Taylor (2020; cited in Singh, Garg, and Sharma 2011) define waste as "Anything other than the minimum amount of equipment, effort, materials, parts, space, and time that are essential to add value to the product." The successful removal of waste is illustrated in the form of, reduced lead times, cost savings and the identification of areas for continual improvement (Jatsi and Sharma 2013). Saboo et al. (2014) successfully implemented VSM in an Indian metal sheet production company. The production lead-time was reduced from 49 days to 11.6 days. Furthermore, work-in-progress inventory was reduced from 28.15 days to 7.6 days. In Summary, the company has improved its quality, reduced operational costs, and improved service levels for its customers. If appropriately designed, VSM should be applied to the AP (Hines et al. 1998; Solaimani, Talab, and Rhee 2019). This would pinpoint process inefficiencies, highlight waste, and indicate areas that should be continuously improved (Seth, Seth, and Goel 2007). These areas will be identified in L'Oreal's AP using VSM. Business is about creating value (Kumar and Reinartz 2016). Kaizen is a Japanese philosophy that focuses on continual improvement (Schroder and Goldstein 2018) and is used in VSM to identify short-term projects that add value to the process and eliminate waste (Jacobs and Chase 2017). These are added to any generic VSM in order to show where improvements such as waste elimination and automation should be applied (Jacobs and Chase 2017; Schroder and Goldstein 2018). Information processing influences L'Oreal's AP. Therefore, product development is dependent on information processing (Helm, Krinner, and Endres 2020). "Automation are technologies that make a global impact by optimizing manual and time-intensive processes using data analytics, thus making the task more efficient, effective and less time-consuming" (Foster and Rhoden 2020,p.56). IBM, Mulesoft, and Microsoft are just a few of the companies that offer application-programming interfaces (API) (IBM 2020; MuleSoft 2019; Microsoft 2020a). API is a "software intermediary that allows two applications to talk to each other" (MuleSoft 2019) and enables processes to be user-friendly (Zubkova and Tagirova 2019). API should be applied to L'Oreal's AP by connecting the product code

sheets to a bespoke system. Microsoft lists 1239 successful case studies of companies that have improved their processes by using API; companies included HP, ASOS, and Walgreens (Microsoft 2020b). Walgreens saw an improvement in its operations, lowered costs, modernized business processes, and decision-making (Microsoft 2020c). At IBM (2020), "API Connect does it all, with the tools to agilely create, secure, manage and share APIs." In the context of L'Oreal's AP, an API system would enable the process to become leaner whilst also enabling agility in the process, improving both the efficiency and effectiveness of the AP. However, a drawback of API is that it is often expensive (Zubkova and Tagirova 2019). As a result, if management at L'Oreal is not familiar with VSM, and the costs to implement a bespoke system using API are high, then L'Oreal implementing a new system will be significantly lower (Zubkova and Tagirova 2019). In contrast, a weakness of VSM is that it is quite difficult to use in complicated production systems with multiple routes; instead, it is suggested that VSM is most effective on a linear process (Singh, Garg, and Sharma 2011). However, to address this issue Braglia, Carmignani, and Zammori (2006) proposed a new framework, "improved value stream mapping." The process integrates other engineering tools and creates a current VSM, which breaks down the complicated production process and focuses on the critical path. After identification of the critical path, it was possible to identify where the improvements should be made (Braglia, Carmignani, and Zammori 2006). As a result, the main value stream was improved, a new critical path was created, and work in progress was decreased to a desirable level (Braglia, Carmignani, Zammori 2006). In addition, Braglia, Carmignani, and Zammori (2006) and Singh, Garg, and Sharma (2011) also highlighted that VSM is predominantly a paper-and-pencil-based technique, therefore the accuracy level is limited. As a result, this tool may not be best suited to companies with a 'high variety-low volume type' production (Singh, Garg, and Sharma 2011). However, L'Oreal's AP is a sequential multi-stage process where each stage is dependent on the other; therefore, VSM will be applied to L'Oreal's AP. Furthermore, there is a vast amount of literature on lean tools such as VSM (Lugert, Batz, and Winkler 2018; Matt 2014). However, there is a lack of literature on VSM being applied to a marketing process. As a result, further development and research is needed in this area in order to maximize the usability and effectiveness of applying VSM to the AP. Despite the weaknesses of VSM (Braglia et al. 2006; Hines et al. 1998; Singh, Garg, and Sharma 2011), the literature suggests that this process can be applied to marketing processes such as the AP (Solaimani, Talab, and Rhee 2019), in order to identify where the process can be streamlined by eliminating non-value adding activities. This would increase the productivity and add value to the process (Kale and Parikh 2019). However, to map an effective process that adds value, process agility needs to be considered in conjunction with lean tools to create an optimal AP.

Agile and its application to L'Oreal's AP

Agile theories have a greater focus on effectiveness instead of efficiency (Kumar, Garg, and Agarwal 2019). According to Jacobs and Chase (2017), agile utilizes strategies aimed at being responsive and flexible to customer's needs. A process is agile if they have the ability to be responsive to the changing, diverse, and unpredictable demands of customers (Denning 2016). When demand is stable and

predictable a lean standardized process is preferred, whereas, agile is preferred when there is high customization in the products (Kumar, Garg, and Agarwal 2019). Suarez-Barraza et al. 2016) indicate that only organizations that devise agile and adaptable processes will be able to compete in today's environment. Agile is designed for flexibility and can be monitored continuously, and constantly improved and optimized (Rodriguez and Molina 2018). The difference between agility and lean is that agility is less focused on the specific stages in a process and more oriented to the managerial and cultural context surrounding the process (Denning 2016; Kumar, Garg, and Agarwal 2019). However, it is suggested that because VSM reduces such a vast amount of waste (Hines et al. 1998; Singh, Garg, and Sharma 2011; Solaimani, Talab, and Rhee 2019), it also enables processes to be more agile as valuable time is freed up to respond to changes, making the process more flexible. As L'Oreal's AP uses a predictable and repetitive process, a lean standardized process is preferred; however, the process should not become too lean to prohibit necessary amendments that need to be made (Denning 2016). Amendments include changes in text, punctuation, and any corrections that need to be made. These amendments currently have to go back through the many stages, which results in wasted time, often causing missed deadlines. Therefore, the concepts of agile should also be considered in addition to lean concept to find the optimal process that is not only efficient but also aims to fulfil the changing needs of B2B customers. The literature suggests that lean theories such as VSM have the capabilities to significantly improve the AP and can be applied to any process including marketing processes (Hines et al. 1998; Singh, Garg, and Sharma 2011; Solaimani, Talab, and Rhee 2019). A current VSM will be created to map L'Oreal's AP, which will identify where non-value adding activities should be eliminated (Kale and Parikh 2019; Solaimani et al. 2019). Secondly, a proposed VSM will be created showing the proposed data and information flows, by evaluating the current VSM, in order to eliminate non-value adding activities from the AP (Kale and Parikh 2019). Furthermore, this will add value and enable the AP to be more productive as wasted time is freed up (Kale and Parikh 2019). This freed time will also enable the process to be more responsive to changes and amendments, therefore creating a more agile AP (Denning 2016; Kumar, Garg, and Agarwal 2019). When implementing an automated AP, non-value adding stages should be eliminated. Additionally, agile theory should be considered to create an optimal process (Denning 2016). Furthermore, in order for VSM to be successful in an organization, senior levels of management need to be educated on lean concepts and its capabilities (Hines et al. 1998). Marketing academics need to urgently understand the lean thinking phenomenon to enhance their performance (Piercy and Morgan 2010).

Research method

For this research project, data for the service level agreement (SLA), which is the time agreed for a task to be completed, and the task time was collected from 12 L'Oreal employees who worked in different functions and have specific knowledge of the artwork process within their function, as shown in Figure 3. Furthermore, data ranging from 2018 to 2019 was collected from L'Oreal's artwork tracker, which is an excel document that the function launch use to manually track the dates and deadlines artworks are received and sent on to the factory, as shown in Figure 4. Finally, data in

the form of feedback, on the current VSM and Proposed VSM, was collected from nine employees, from different levels of seniority, to create a final proposed VSM. The data was obtained via e-mail, and asked what advantages and disadvantages an automated system would have on their role. Moreover, employees were asked what changes should be made to the current VSM and the proposed VSM. Additionally, employees were asked what issues caused the most delays in artworks not being completed on time. Finally, the Launch manager was asked how much it costs to destroy products if mistakes have been made on an artwork. All data were obtained through e-mail communication.

Data analysis, findings and discussion

L'Oreal's AP creates language specific artworks across Europe (Figure 1). Each brand corresponds with the nine different factory locations based on the products each factory produces (Figure 2). This practitioner note will discuss findings and data collected for products specifically in the UK market. Twelve L'Oreal employees were asked how many days they were given to complete a task and how long it took them to physically complete the task. The findings are illustrated and divided by each stage in the process in Figure 3. This is also divided by product renovations (A) and New Product Developments (B). A renovation is a small change to an already existing artwork. New product development is the creation of a new artwork that has not previously been used. Amendments are mistakes that occur on both renovations and NPD in the artwork process. Furthermore, Figure 4 illustrates a sample of the data collected from the artwork tracker. The data is manually entered by launch. They act as an intermediary between the factory and marketing for the different brands. BAG is a French word that describes the process of adding the barcode to an artwork. The tracker tracks the dates launch receives a request for an artwork, the deadlines the artworks and BAG are due, and the dates these are sent back to the factory. The EAN is the number that is used on the barcode and cannot be sold if this number is incorrect. The EAN and material code is manually entered and is used to identify the specific artwork. Additionally, the artwork tracker has a section for comments, which is illustrated in Figure 5. The comments show some of the reasons artworks are pushed back and delayed for both renovations and NPD, highlighting the requirements for amendments. Additionally, the launch manager was asked how much it costs to destroy products in the event that a mistake has been made on an artwork. Findings showed that added costs of £145 to destroy 1 pallet (2500 units) of general stock and £240 to destroy 1 pallet of flammable stock (2500 units) incurred in addition to the unit cost of the product. In addition to these costs are the costs of internal transport and admin certificate charges, which costs approximately £300 for 5 pallets.

Labels for different countries
FR – France
DFSN, Denmark, Finland, Sweden, Netherlands
GB, Great Britain
DE, Germany
GR, Greece
PO, Poland
PT, Portugal
CZ, Czech Republic
IT, Italy
HU, Hungary
ES, Spain
BG, Bulgaria

Figure 1. Countries that produce their own labels.

Aulnay, France	Tubes
Rambouillet, France	Bottles
OMA, France	L'Oreal Paris makeup
Soprococ/ St Quentin, France	Aerosols
Kosmepol/Varsovie/Warsaw, Poland	Shampoo and Conditioner
Karlsruhe, Germany	Pots
Israel	Oils and Serums
Libramont, Belgium	Colorants
Settimo, Italy	Shampoo and Conditioner

Figure 2. Factory locations and what they produce.

Stage	SLA No. Of days	Time to complete task (minutes)
1 Development	1-3	3
2 Factory	1-5	3
3 Launch	1-2	3
4 Marketing	(A) 3-5 (B) 10-15	(A) 180 (B) 600
5 Launch	1-2	5
6 Factory	1-5	5
7 Supplier	5-10	90
8 Factory	1-5	3
9 Launch	1-2	3
10 Marketing	1-5	60
11 Launch	1-2	5
12 Factory	1-5	5

Figure 3. The service level agreement (SLA) and time to complete a task.

Brand	Material Code	Description	EAN	Date Received	AW Deadline	AW - Launch	AW - Factory	BAG Deadline	BAG - Marketing	BAG - Launch	BAG - Factory
Garnier Haircare	C6013101	UD ASH CRANBERRY 360 GB DF	3600542133470	21-Feb	08-Mar	17-Apr	17-Apr	20-May	14-May	22-May	22-May
Garnier skincare	C4444752	S.ACT BB ANTI AGE 12H T50 GB LIGHT	3600541227897	20-Aug	30-Aug	31-Aug	31-Aug	01-Oct	26-Sep	25-Oct	25-Oct
Garnier skincare	C4444852	S.ACT BB ANTI AGE 12H T50 GB MEDIUM	3600541228054	20-Aug	30-Aug	31-Aug	31-Aug	01-Oct	26-Sep	25-Oct	25-Oct
Garnier skincare	C5505753	S. ACT BB PURE ACT T50 GB light	3600541480049	20-Aug	30-Aug	31-Aug	31-Aug	31-Oct	29-Oct	30-Oct	30-Oct
Garnier skincare	C5926002	S.ACT BB CR.NATURAL T50 EN LIGHT	3600542091954	20-Aug	30-Aug	31-Aug	31-Aug	17-Oct	15-Oct	23-Oct	23-Oct
Garnier skincare	C4341652	S.ACT BB OIL FREE 12H T40 GB MEDIUM	3600541194427	20-Aug	30-Aug	31-Aug	31-Aug	04-Sep	28-Sep	23-Oct	23-Oct
Garnier skincare	C5926102	S.ACT BB CR.NATURAL T50 EN MEDIUM	3600542091961	20-Aug	30-Aug	31-Aug	31-Aug	17-Oct	15-Oct	23-Oct	23-Oct
Garnier skincare	C4341552	S.ACT BB OIL FREE 12H T40 GB LIGHT	3600541194410	20-Aug	30-Aug	31-Aug	31-Aug	03-Oct	02-Oct	23-Oct	23-Oct
Garnier skincare	C3976753	S.ACT PURE CLEANSER 3n1 T150 GB W	3600540676580	10-Aug	27-Aug	26-Sep	28-Sep	04-Oct	03-Oct	16-Oct	16-Oct
Garnier skincare	C6253900	Garnier Tissue Mask Crow Feet Eye	3600542238632	29-Nov	07-Dec	14-Jan	14-Jan	15-Dec	28-Jan	29-Jan	29-Jan
LP Haircare	A7428452	ELVIVE EXTRAORD OIL MASK POT 300ml	3600522451815	29-Oct	14-Nov	28-Nov	28-Nov	07-Dec	05-Dec	06-Dec	06-Dec
LP skincare	A9199200	Revitalift Filler Eyes 15ml	3600523201310	23-Jul	31-Jul	17-Sep	20-Sep	15-Oct	09-Oct	12-Oct	12-Oct
LP skincare	A9816700	AP Golden Age Rosy Eye 15ml	3600523718597	10-Aug	31-Aug	04-Sep	04-Sep	11-Oct	05-Oct	01-Nov	01-Nov
LP skincare	A8671900	DE REV FILL HA NUIT POSO EN_FD	3600523201303	20-Aug	31-Aug	11-Sep	11-Sep	03-Oct	28-Sep	12-Oct	12-Oct
LP skincare	A9200101	DE Revitalift Laser Eye 15ml 2nd Run	3600522251750	26-Sep	04-Oct	05-Oct	15-Oct	29-Oct	30-Oct	31-Oct	31-Oct
LP skincare	A9020600	Dermo Hydra Genius Waters 70ml N/C	3600523363186	19-Oct	29-Oct	08-Nov	08-Nov	05-Dec	29-Nov	03-Dec	03-Dec
LP skincare	A9186500	EXT CLAY FOAM TU150 EN EXFOLIATING	3600523430925	14-Nov	20-Nov	03-Jan	03-Jan	18-Jan	14-Jan	18-Jan	18-Jan
LP skincare	A9228900	DE FF CLEANSING MILK D/S 400ml	3600523448760	14-Jan	21-Jan	07-Feb	07-Feb	25-Feb	21-Feb	27-Feb	27-Feb
LP skincare	A5743153	Dermo Exp Eye Make Up Remover 125ml	5011408014341	04-Jan	18-Jan	23-Jan	23-Jan	28-Mar	22-Mar	04-Apr	04-Apr
Sun & Body	C3575617	AS Clear Spray SPF50+ 200ml 17	3600541012103	21-Sep	03-Oct	05-Oct	05-Oct	21-Nov	20-Nov	03-Dec	03-Dec

Figure 4. Sample of data from the artwork tracker.

Comments/Status
Capital C needs to be amended - otherwise approved 08/05
Spelling mistakes - can be fixed without doc or DDR 16/05
BAG resent (amended)
Ai & Vectorised files
Made in
London W6 8AZ
changes the size of the flame
Marketing want to change AW - sent this across the 01/02
BAG formula incorrect 27/05
rejected 200ml/300ml mask

Figure 5. Sample of comments on the artwork tracker.



Figure 6: Garnier Haircare artwork

Current VSM

L’Oreal’s AP has 12 stages these include; development, the factory, launch, marketing, TAG, the supplier, and legal and scientific. TAG is a French word that describes the function that helps to create the files for artworks. The purpose of this process is to create the labels for products in the consumer products division, an example is shown below in Figure 6. Furthermore, the AP is used for the following brands: Garnier Haircare, Garnier Skincare, Sun and Body, L’Oreal Paris Skincare. The literature concluded, that mapping the AP using VSM highlights high levels of waste, inefficiencies, and process improvements (Hines and Rich 1997). Furthermore, lean tools can be applied to any process (Hines and Rich 1997; Solaimani, Talab, and Rhee 2019). For L’Oreal’s AP, the process needs to respond effectively to scope changes, corrections, and amendments (Kumar, Garg, and Agarwal 2019). Therefore, a current VSM of L’Oreal’s AP has been created and is shown in Tables 1 and 2. The map has been split into two sections. Table 1 is the creation of artworks, stages 1–7. In this stage, marketing and TAG physically create the labels and send these to the supplier. Furthermore, Table 2 (stages 7–12) is where the supplier adds the barcode to the artwork (BAG), which is then sent back to marketing to check and approve. The data in this map has been collected from 12 employees representing each function (Figure 3) at L’Oreal and is based on the service level agreement (SLA). The blue shows the longest SLA and the red line shows the shortest service level agreement, both are calculated in minutes. Additionally, for Table 1–6 the number of days is shown in brackets, e.g., one working day is 420 minutes shown on the map as 420 (1). Furthermore, the data box (Table 1–6) contains the average of the longest SLA and

shortest SLA as a percentage for value-added activities (VA) and non-value added activities (NVA). A renovation is a small change to an already existing artwork. New product development (NPD) is the creation of a new artwork that has not previously been used. Additionally, the VSM has been divided by product renovations (A) and NPD (B) in order to accurately evaluate how much value is being added. Furthermore, the red 'X' and green tick (Table 1–6) highlights whether the artwork should move onto the next stage or needs to be pushed back to the specific stages (Grey arrow and corresponding number) for the amendments to take place. For example, if an amendment is pushed back at stage 11 (Table 2) it will go back to stage 4 or 7 depending on the requirements.

Current VSM findings

The data collected identifies that it takes a minimum of 23 days and a maximum of 51 days to complete an artwork according to the SLA (stages 1–12). However, only 2.48% of this time adds value for a renovation (A) and only 2.52% for a NPD (B), which is extremely low, as 97% (approximately) of the time is, wasted (Figure 11). The highest VA is just under 12% in stage 4 (Table 1, data box) of the process. As a result, there is significant room for improvement, in order to create a more efficient and effective process, which eliminates some of the wasted time in the current process (Kumar, Garg, and Agarwal 2019).

Current VSM compared with the artwork tracker

The current VSM in Tables 1 and 2 shows the SLA. This is compared with the actual data collected from L'Oreal's artwork tracker, which enables authors to highlight possible process inefficiencies. L'Oreal's artwork tracker is tracked by launch and therefore tracks stages 3–12 in the AP. Figure 7 illustrates the average time the factory allows marketing to complete the artwork and the time it takes for this artwork to be completed. Additionally, Figure 8 shows the time the factory allows for the entire process to be completed and how long it takes marketing to complete these. According to the SLA, on average the factory has allowed sufficient time for renovations to be completed (6–14 days; stages 3–6, as shown in Table 1) however, for NPD sufficient time has not been allowed on average (13–24 days; stages 3–6, as shown in Table 1). However, it is not clear from the current AP whether the artworks are renovations or NPD; therefore, it is not possible to conclude whether allowed sufficient resources have been allocated. An automated AP should remove this issue as data will be collected and monitored to ensure sufficient resources such as manpower and time are allocated, so that B2B customer requirements are effectively met (Kumar, Garg, and Agarwal 2019).

Additionally, 4 out of 5 brands missed the artworks deadlines when measured against the time the factory allowed (stages 3–6), ranges from 11 to 17 days, with Sun and Body performing the worst, taking 63 days on average to complete artwork and missing the deadlines on average by 48 days. Garnier Skincare performed better in relation to all the other brands, missing the average deadline by 8 days, despite being allocated the shortest time of 11 days to complete the artworks (Figure 7). As a result, it is therefore unclear whether the factory did not allow enough time for these artworks to be completed or whether the sole reason was due to marketing missing the

deadlines due to miscommunication. Looking at the data closer it is evident that Sun and Body's deadlines were impacted by human error; one artwork was 114 days late due to a miscommunication of information (Task deadline 27 August 2019 – submitted 21st December 2019). The marketing team believed these had already been completed, whereas the factory did not have these artworks and therefore production could not move forward. As a result, the marketing, factory, and launch teams had to check through all of their e-mails to try and track them down, wasting time that should have been spent on other work. They were unable to find the artworks needed; therefore, marketing had to recreate them, putting on hold other tasks that need to be completed, which resulted in duplicate work. Such long delays have significant impacts on the clients and the customers if products are not produced in sufficient time. However, with an automated system, data is automatically collected and differentiated to specifically identify where issues are frequently occurring. Furthermore, this will identify whether the SLA is sufficient for each function, or whether marketing requires more resources (more time and labor) to meet the deadlines of B2B customer orders.

However, Figure 8 illustrates stages 3–12, which shows the time allowed and the time it takes to complete all the tasks. Four out of five brands still missed the deadlines to approve the BAG, with Sun and Body performing the worst missing the approval deadlines by an average of 40 days. Sun and Body were previously late by 48 days (stages 3–6). Furthermore, the reduction of 8 days from 48 days to 40 days means the stages between 7 and 12 have picked up the pace showing that there has been a reduction of 8 days. Additionally, these stages have had to prioritize these artworks ahead of other work, which contributes to creating a bottleneck resulting in more missed deadlines. Furthermore, for a renovation to be completed the SLA ranges from 16 to 43 days (stages 3–12, Tables 1 & 2). Four out of five brands were given more than 43 days to complete the artworks. L'Oreal Paris Haircare was given the lowest number of days (i.e. 38 days); however, they were the only brand to meet the BAG deadlines. In addition, for NPD the SLA ranges from 23 to 53 days. Three out of five brands were given more than 53 days to complete NPD (stages 3–12, Tables 1 & 2); however, all of these brands still missed the deadlines. There are various reasons as to why these deadlines may be missed and the consequences they have, which is illustrated in Figure 9 in the form of a fishbone diagram.

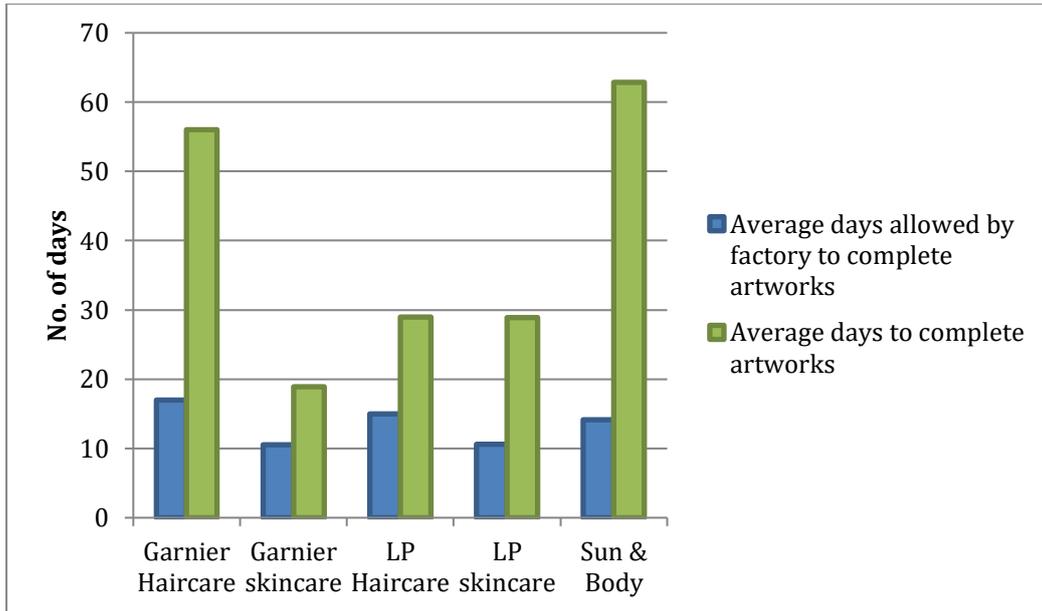


Figure 7. Average time to complete artworks.

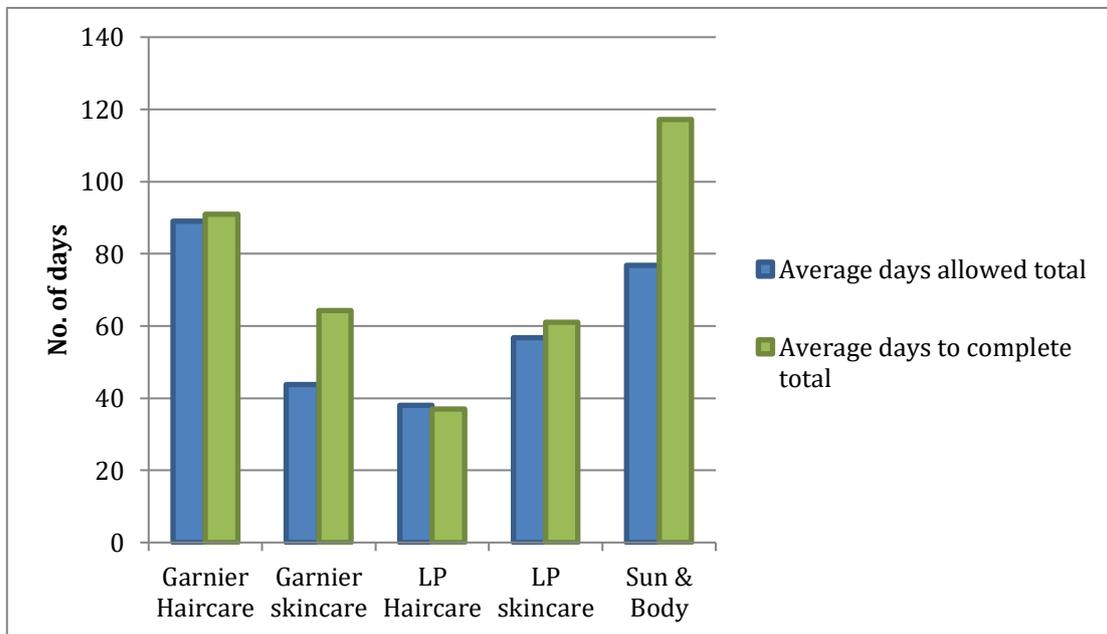


Figure 8. Average time to complete an artwork and average time allowed by the factory.

Cause and Effect Diagram

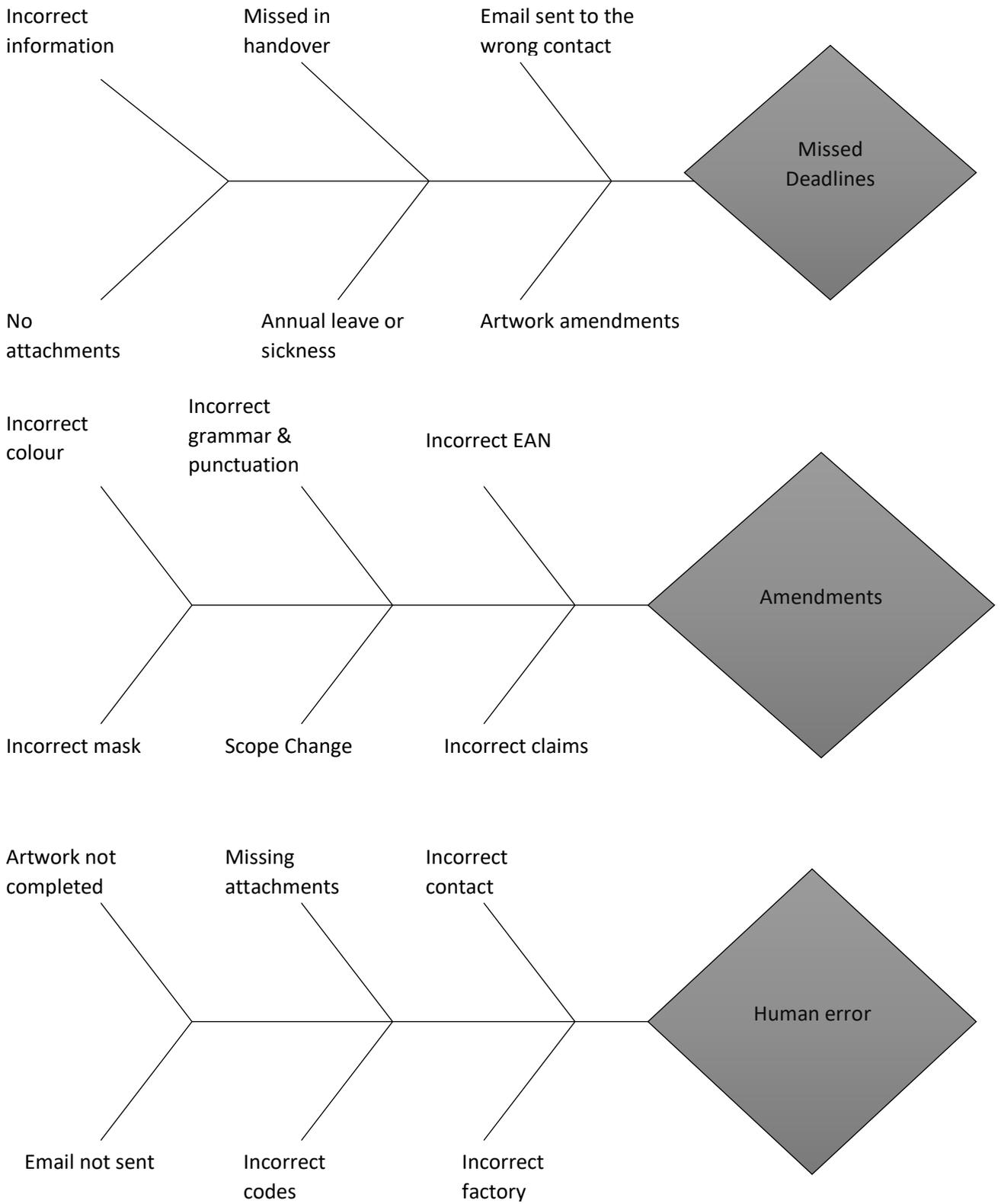


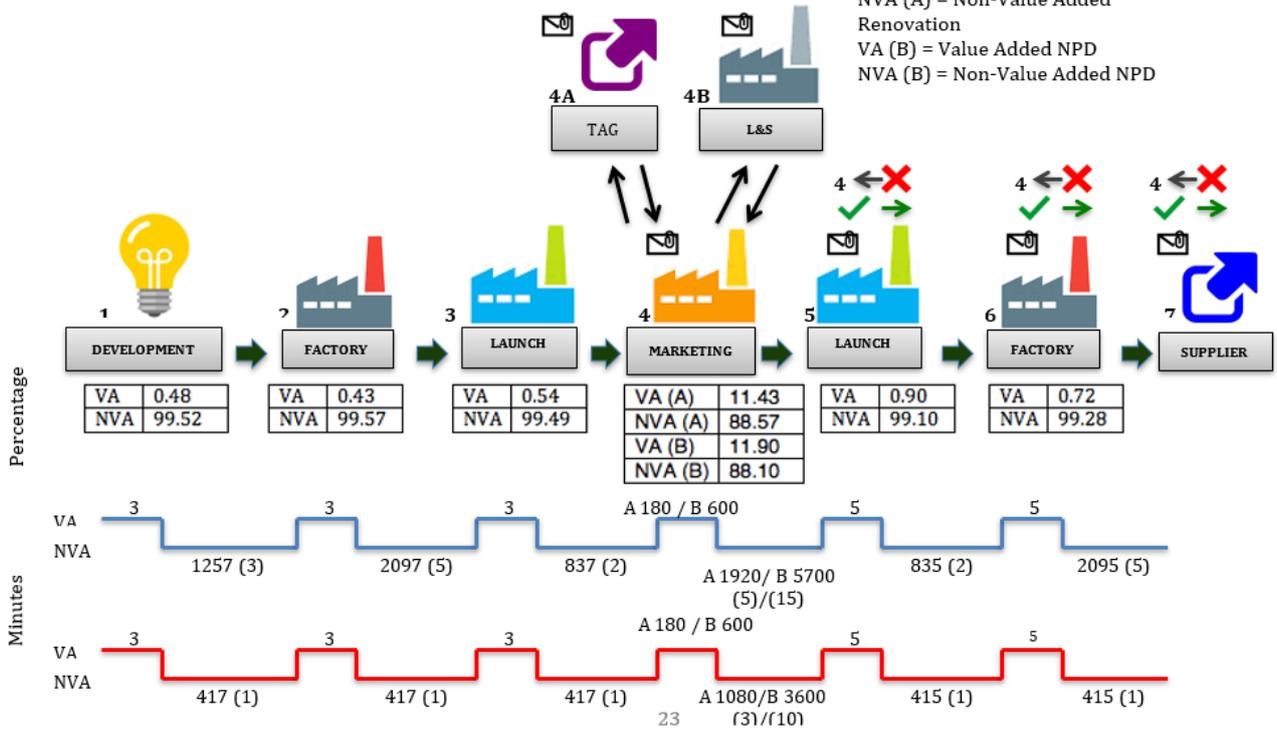
Figure 9. Cause and effect diagram for artwork delays.

Missed deadlines, amendments, and human error: cause and effect analysis

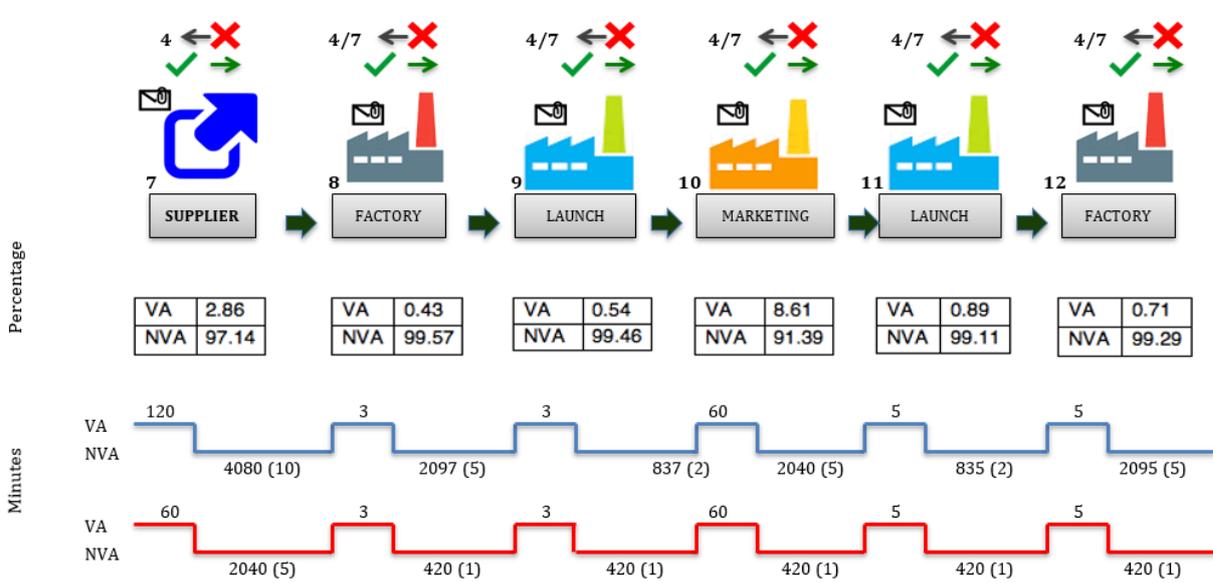
Figure 5 shows the issues that have been raised on the artwork tracker in the comments section. For example, comments included: “marketing requested ‘Vegan Formula’ to be added,” “Artwork missing,” and “Capital C needs to be amended.” Each of these issues resulted in duplicate work and delays, as amendments needed to be made or artworks recreated, these are then pushed back to stage 4 or 7 (Tables 1 & 2) depending on the changes that need to be incorporated in the artwork. These issues have been consolidated and illustrated in the form of a fishbone diagram (Figure 9). Multiple causes result in missed deadlines and artworks needing to be amended. At L’Oreal graduates and interns are often responsible for the completion of artworks. These graduates switch roles every 6 months and interns every 12 months. As a result, work content and task requests are lost, due to e-mail threads not available to the new graduate, which is especially difficult when trying to track down missing artworks. Furthermore, employee’s positions change, each function needs to send e-mail requests to the new previous contact, which has been relocated. Moreover, there is no standardized tracker that allows the new contact to see the status and progress of previous artworks, as the artwork tracker is not accessible to all functions. Similarly, the same difficulties occur when those responsible are on annual or sick leave as the work is stored in their e-mail accounts. Additionally, the lack of visibility and traceability has a knock on effect on urgent tasks. For example, Garnier deodorants were raised on the tracker as “missing” once the deadline had passed. Production chased the factory for the Garnier deodorants, causing the factory to chase launch and marketing with little time to complete these. If artworks are delayed and do not meet their deadlines then production has to be postponed. As a result, orders are not fulfilled, which results in dissatisfied clients and customers. With an automated system, many of these causes shown in Figure 9 would be avoided, as visibility on deadlines and the status of artworks would allow access at all times to all contacts and indicate when tasks have not been completed. However, if mistakes are not identified before they go to production, then the product must be destroyed, which is a legal requirement. If 12,500 products need to be destroyed, an added cost of £1025 will be incurred for general stock and an added cost of £1500 for flammable stock, this is excluding the unit cost of the product. Legal requirements include the claims on a product; such as the expiry date, e.g. 12 months or 18 months or a claim that a product has ‘No Sulfate.’ Furthermore, the correct EAN code (barcode) is a legal requirement, which would be automatically checked with a new system. For example, in January 2019, it was highlighted that the Garnier 7 Days Body Lotion was printed with the wrong EAN code on 100,000 units. It was estimated that it would cost approximately £10,000 to re-sticker the products. Additionally, the Superdrug order date was missed. This was due to human error; marketing simply selected the wrong code from the product code sheet. These mistakes are frequently made due to the manual process. Not only does this incur costs to L’Oreal, it also results in dissatisfied B2B customers, as the orders are not fulfilled to the agreed requirements.

**TABLE 1: CURRENT VSM
ARTWORK CREATION**

A = Renovation
 B = NPDP
 VA (A) = Value Added Renovation
 NVA (A) = Non-Value Added Renovation
 Renovation
 VA (B) = Value Added NPDP
 NVA (B) = Non-Value Added NPDP



**TABLE 2: CURRENT VSM
BAG APPROVAL**



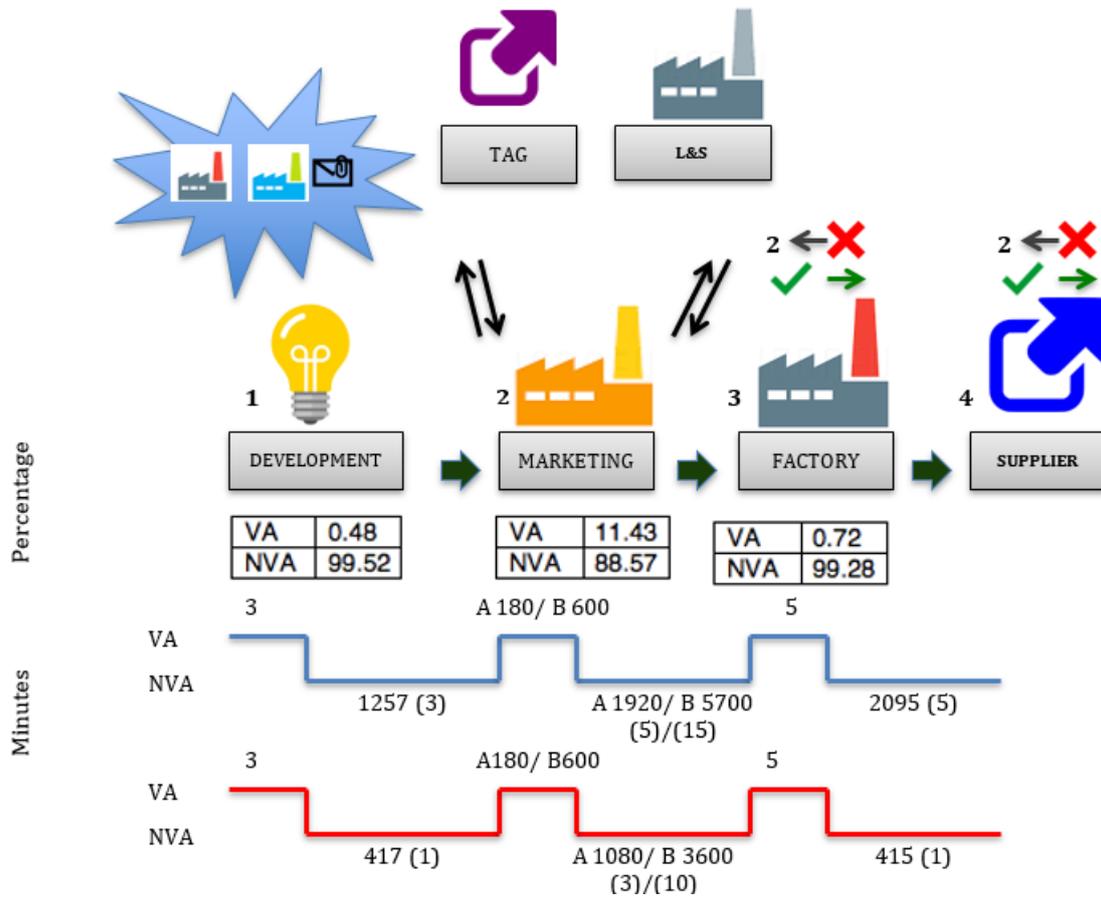
Proposed changes to current VSM

The codes launch and the factory manually enter in stages 2 and 3 should be automatically pulled from the product code sheets. Additionally, stages 5, 8, 9, and 11 currently act as a 'messenger,' by sending the PDF file to the next stage, adding little value to the process. Instead, with an automated system, each function will have visibility on the status and progress of artworks and a new critical path created. As a result, this significantly reduces the lead-time and frees up more time in the process, potentially removing up to 23 days. As a result, the process will be leaner and more agile to respond to changes and the requirements of B2B customers. Furthermore, an automated system tracks the dates and times each function completes their steps and highlight when deadlines are being missed and who is accountable. This extra data should be used in the future to accurately allocate resources to each brand. Furthermore, this will remove duplicate work as each function currently tracks artworks independently of other functions and brands. Therefore, it is proposed that stages 2,3,5,8,9, and 11 in the current VSM be automated using API. This will be achieved by connecting the local country's product code sheet to a bespoke system.

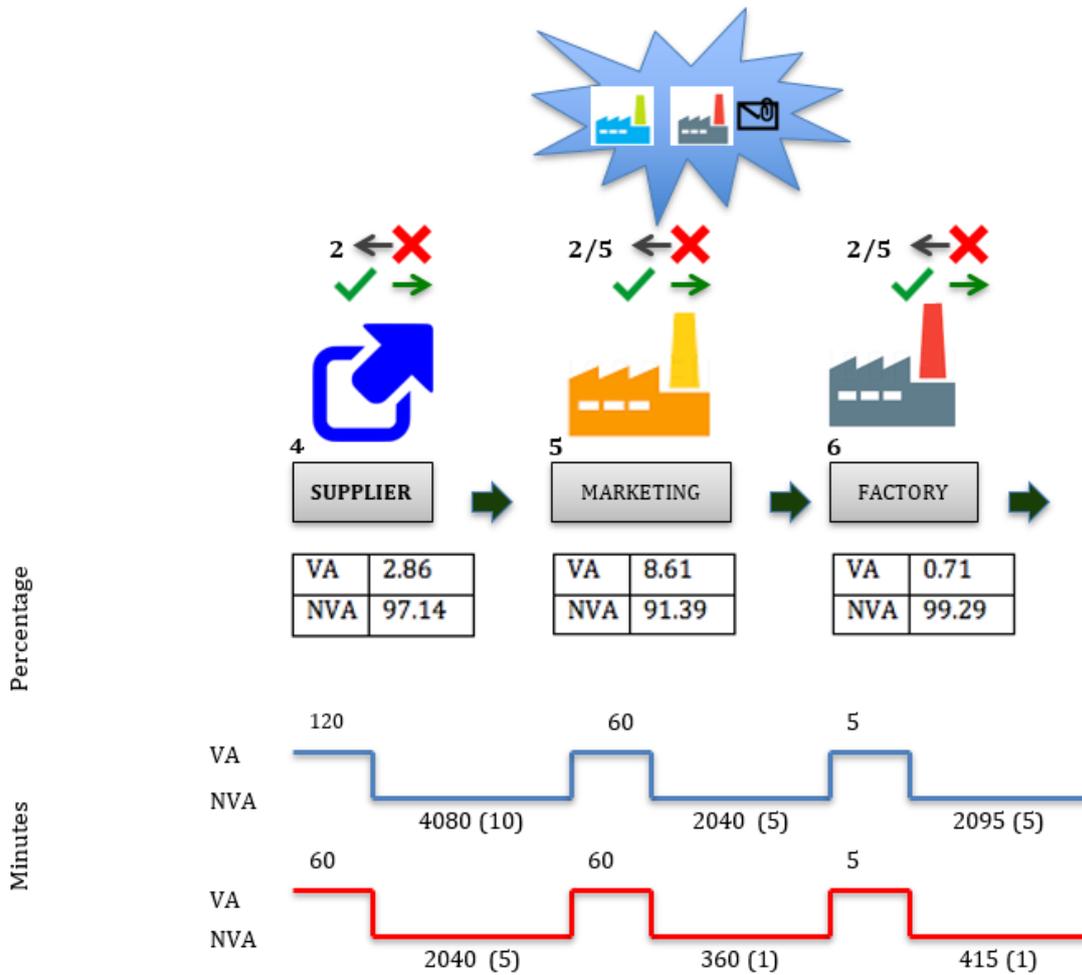
Proposed VSM

The Proposed VSM (Tables 3 & 4) has eliminated 6 out of 12 stages from the Current VSM (Tables 1 and 2), which resulted in a 50% reduction in the total number of stages. Automated stages are illustrated in the blue star bubble in Tables 3 and 4. Furthermore, the proposed process would no longer use e-mail; therefore, the e-mail icon is shown in the blue star bubble. Instead, a bespoke system would allow the artwork PDF files to be uploaded onto the system and automatically forwarded to the correct contact, significantly reducing human error. Additionally, the system would be split by brand and users would be given access to the necessary sections, where the codes, deadlines, and current progress would be displayed. Tables 3 and 4 show, an amendment at stage 6 would return to stage 2 or 5 depending on the required change. Furthermore, the SLA collected from 12 L'Oreal employees has been used to illustrate the lead-time to complete the artwork with an automated system. Currently, it takes a minimum of 23 days and a maximum of 51 days to complete an artwork. However, with an automated system, this is reduced to a minimum of 17 days and a maximum of 36 days, resulting in an average decrease of 10.5 days per artwork. Moreover, this reduction would significantly reduce the number of missed deadlines and enable the subsequent stages to be more responsive to meet the requirements of B2B customers (Rodriguez and Molina 2018). Furthermore, the average VA and NVA for the current VSM and the proposed VSM are compared. This is illustrated in Figure 10. The VA for a renovation has increased by 2.48% to 4.31%. Additionally, the VA for NPD has increased from 2.52% to 4.41%. As a result, the proposed VSM shows a 73% increase in value added time for a renovation and a 75% increase in value added time for NPD (Figure 10).

**TABLE 3: PROPOSED VSM
ARTWORK CREATION**



**TABLE 4: PROPOSED VSM
BAG APPROVAL**



Amendments comparison: current VSM and proposed VSM

Figure 11 shows the added time for amendments calculated from the Current VSM and Proposed VSM (Table 1, 2, 3 and 4). The Current VSM shows that one amendment adds up to 36 days in the artwork process (Stage 12 back to 4, Figure 11). This has been reduced to 25 days in the Proposed VSM (Figure 11), which is a reduction of 11 days. On average, the Current VSM amendment adds 13 days to the process, in the Proposed VSM, this has been reduced to 10 days.

Artwork Type	Current VA	Current NVA	Proposed VA	Proposed NVA	Percentage change in VA
Renovation (A)	2.48%	97.52%	4.31%	95.67%	73%
NPD (B)	2.52%	97.48%	4.41%	95.59%	75%

Figure 10. VA and NVA for the current and proposed VSM.

Amendments		
	Stage	Added time in days
Current VSM (Table 1 and 2)	5 back to 4	1-2
	6 back to 4	2-7
	7 back to 4	7-17
	8 back to 4	8-22
	9 back to 4	9-24
	10 back to 4	10-29
	11 back to 4	11-31
	12 back to 4	12-36
	8 back to 7	5
Proposed VSM (Table 3 and 4)	3 back to 2	1-5
	4 back to 2	6-15
	5 back to 2	7-20
	6 back to 2	8-25
	6 back to 5	1-5

Figure 11. Current VSM and Proposed VSM added lead-time for amendments.

Validation of proposed VSM

Feedback in the form of qualitative responses was used in order to validate the Proposed VSM. Feedback from nine L’Oreal employees at different levels on seniority from the launch, factory, and marketing teams was collected. This was to evaluate whether VSM pinpoints where the process should be improved. Respondents in all functions suggested that “using email to transmit the files causes delays” in their role. Furthermore, the factory commented that there was a “high risk of losing these files on email” and “if someone went on annual leave the artwork process is significantly delayed.”

All respondents confirmed that an automated system would improve delays and have a positive impact on their roles. Furthermore, the supply chain manager stated “To track progress and to know which project is at which stage, what is late etc. would be very helpful.” Respondents from the factory and marketing team commented that an

automated system would allow them to have “greater visibility on the tasks,” which will help them to “prioritize their work.” Additionally, launch commented that this would significantly reduce the amount of time wasted inputting data manually. Furthermore, when asked what disadvantages an automated system would have on their role, the launch intern commented that they may have “less control over the process” and that the “process would be less easy to manipulate.”

Furthermore, respondents were asked ‘what should be improved on the Proposed VSM’? Unfortunately, most of the respondents lacked understanding lean concepts and VSM. This was a common issue found in the literature review (Hines et al. 1998). However, one factory manager suggested that the Proposed VSM should be improved to “show the time saved from the automation and elimination of stages on the map.” Therefore, a final VSM has been created to illustrate the time saved on the Proposed VSM. Tables 5 and 6 include the cumulative number of days saved, shown as a green line on the Final Proposed VSM. Additional comments suggested that it would be helpful to have alerts on the system to tell the contact when a deadline is approaching for work that has not yet been completed. Other comments from the respondents representing the launch and marketing teams highlighted that they felt the deadlines given were unrealistic and did not give sufficient time for the work to be completed.

**TABLE 5: FINAL PROPOSED VSM
ARTWORK CREATION**

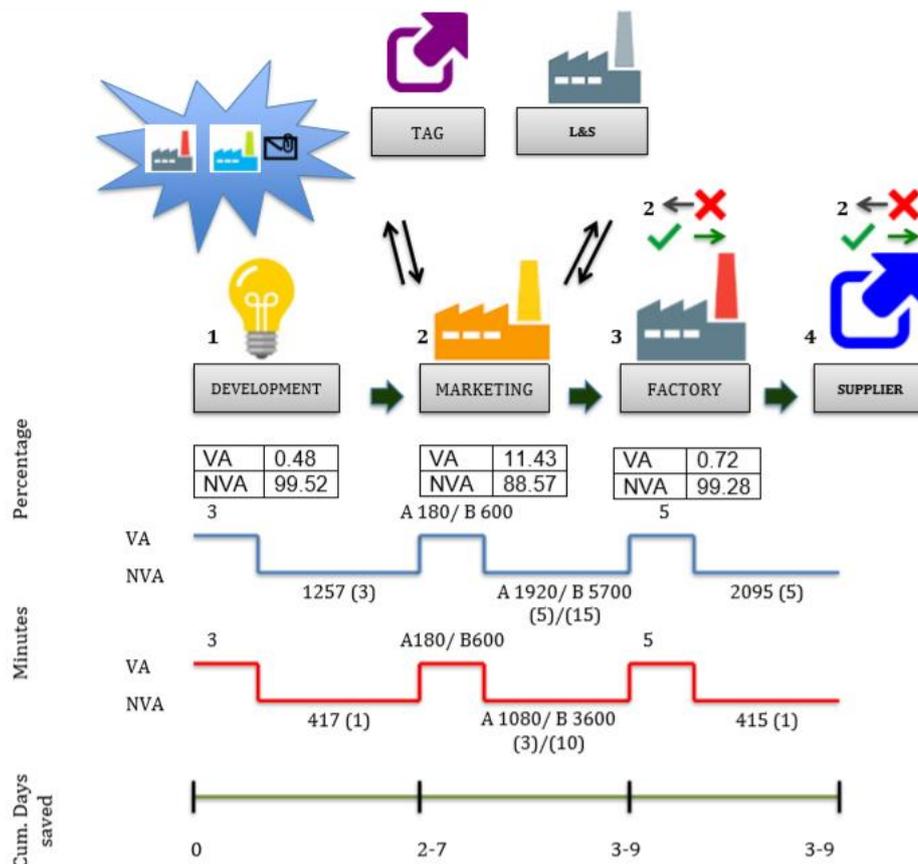
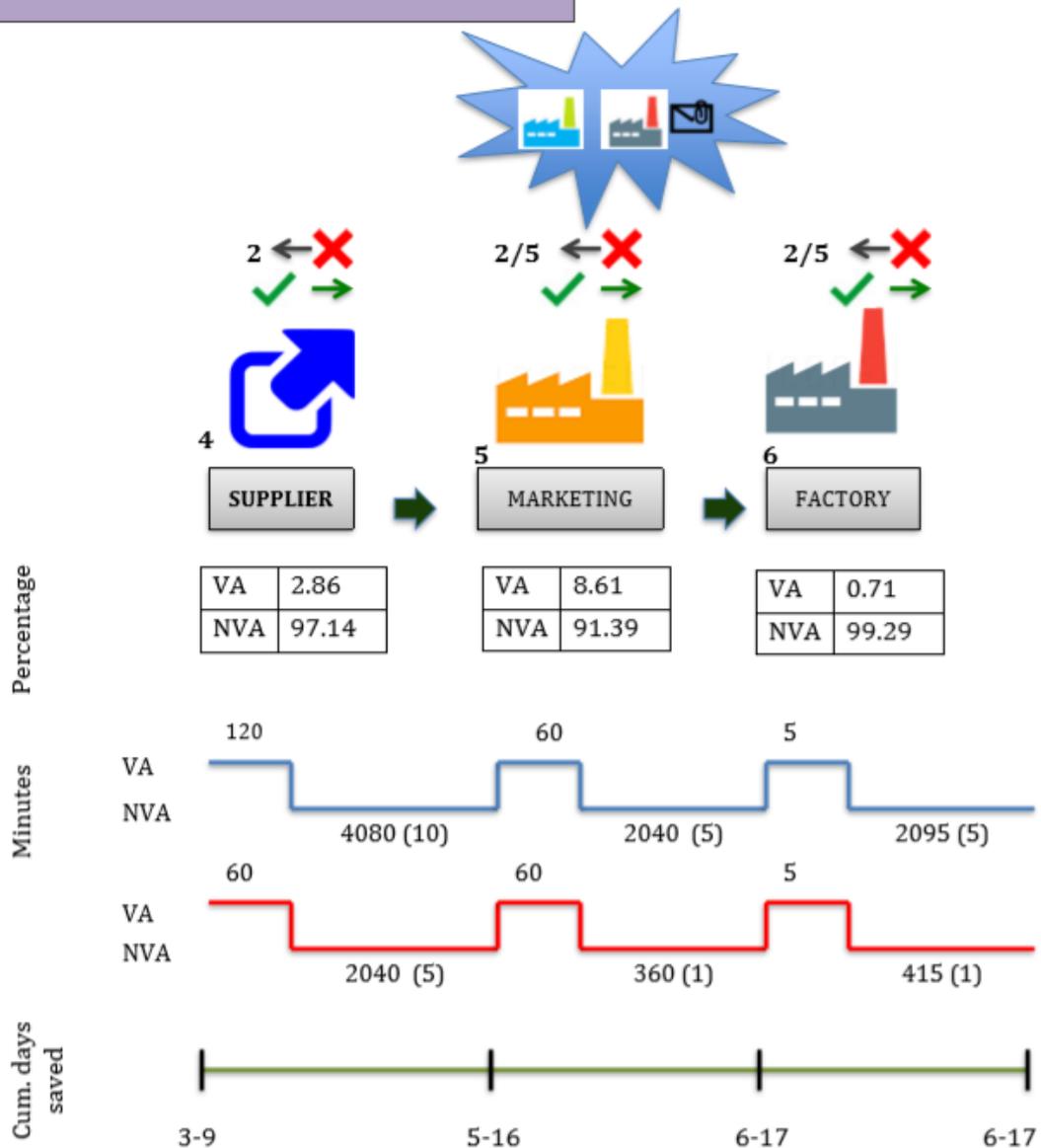


TABLE 6: FINAL PROPOSED VSM BAG APPROVAL



Conclusions and further research

In conclusion, VSM has successfully identified inefficiencies in the AP and highlighted stages that should be removed or automated using API. Additionally, a new critical path was created which illustrated an average reduction of 28% of time spent on the AP, and an average saving of 10.5 days per artwork created, enabling L'Oreal to maximize their value adding activities. Additionally, the value added time has increased by 73% for a renovation and 75% for NPD because of the proposed VSM. Additionally, stages in the proposed VSM have been reduced by 50% by removing 6 stages out of 12 from the current VSM. Such a high reduction enables the process to become more agile, as each function has more time to respond to amendments and changes in the AP. This resulted in an average reduction in the time it takes for

amendments to be completed from 13 days to 10 days. It is not clear from the data whether the factory is allowing enough time or whether marketing is lacking in resources. An automated system will give visibility so that this issue is resolved. Additionally, human error often occurs in the AP and results in extra destruction costs, by automating the system these costs will be significantly reduced. Therefore, L'Oreal should implement an automated system to reduce lead times, maximize VA activities, eliminate NVA activities, and reduce human error. As a result, the AP will be more responsive and flexible in meeting the requirements of its B2B customers (Jacobs and Chase 2017). However, senior levels of management need to be educated on VSM and lean concepts, as it was clear from the feedback that there was a lack of understanding of VSM, which is consistent with the issues stated in the literature review (Hines et al. 1998). Furthermore, research into the 12 other countries (Figure 1) should be explored to create a bespoke system that allows for synergy across the countries in Europe. Moreover, there are different brands and divisions in L'Oreal across Europe, which should equally benefit from a standardized AP.

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