

Agile Methodologies in the Fashion Industry

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ABSTRACT

In the document, we expose the application of the agile SCRUM and Kanban methodologies in an Ecuadorian textile company to improve the control of production processes. We have considered a company that produces clothing for all its subsidiaries in Ecuador. The participating groups were previously trained, both on methodologies, as well as on the tool developed and made available to control the production process. The methodological process was adapted to the jargon recognized by the participants. Data analytics were integrated to generate order management indicators, such as production and sales through key performance indicators (KPI). This experiment is attractive for textile companies, as well as for other lines because the methodologies allow organizing management, identifying bottlenecks for timely decision-making.

Keywords: Agile Methodologies, SCRUM, Kanban, Fashion industry

INTRODUCTION

The signatories of the Agile Manifesto of agile software development in 2001 generated four values and twelve principles¹, which we highlight in this proposal. With the manifesto in mind, a great effort has been made to adapt its organizational culture to an agile methodological process; we have respected the empirical control of processes (transparency, accuracy, observation, and adaptation) of the company, adjusting them to our research. We highlight the values of Scrum: openness, courage, focus, respect and commitment and the principles that guide this process. The enrichment of the manifesto is the substantive points considered and the agreements.

On the other hand, SCRUM² as an agile methodology, in accordance with Kanban, are powerful weapons, which can be considered in the productive environment; As a whole, they guide the process in an orderly and systematic way. Applying an agile methodology requires that the company have clear processes, in this way it contributes to achieving production objectives, considering priorities and with periods of time that allow generating the minimum viable product (MVP), to reduce costs and improve production levels. SCRUM manages both personnel and processes. Instead, Kanban detects bottlenecks, to make corrections as soon as possible.

Currently, the textile industry worldwide faces several problems: One of them is brutal competition for markets worldwide (Yusuf et al., 2004, Christian and Zimmers Jr, 1999). Another great problem of the textile industry and fashion in particular, changes in short periods (Christopher, 2000, Silva et al., 2019), when the seasons of the year change, they also change: models, colors, designs and so on. therefore, rapid adaptation to change is a feature required by the textile industry, therefore, research, development, preparation, and distribution times must also be short, that is, companies must be agile (Yusuf et al., 2004, Christian and Zimmers Jr, 1999), but for this, agile methodologies are a support since adaptation to change is the rule (Christian and Zimmers Jr, 1999, Christopher, 2000). On the other hand, it has been observed that the textile industry itself is reluctant to accept new methodologies that help to improve its processes. Additionally, companies are mostly interested in process analysis, but they do not observe agile methodologies as a complementary option to respond to their requirements. We have considered a large textile company in our country Ecuador in which the Kanban and SCRUM methodologies have been applied, to control orders and production. The production was guided by the SCRUM methodology, and the progress control was adapted to Kanban boards. People and processes were reorganized to control production processes. A set of production teams from the company formed the SCRUM teams. Terminology adapted to their everyday jargon was applied. Additionally, the staff required prior training.

The contribution is to analyze, organize, and show how agile software development

¹ <https://agilemanifesto.org/>

² <https://www.scrum.org/>

contributes to the organization of processes adopted by the textile industry, identifying bottlenecks to make decisions on time and ensuring product quality when a good definition “Done”. For this purpose, an analytical framework is built, to guide the production process in a visual, incremental, cooperative, and controlled way, systematizing the textile production processes.

The best thing about this proposal is the inclusion of performance indicators known as KPIs (Key performance indicators). KPIs measure the behavior of a process or activity. And the most important thing is to observe the effects of applying an agile methodology in a production environment. From the teams' perspectives, we observe openness, and possible difficulties with those who produce the garments.

Next, in unit 2 a theoretical analysis is presented, in unit 3 the method used during the experiment is presented, in unit 4 one of the results of the indicators applied to measure the process is presented. and finally in unit 5 conclusions are presented.

THEORETICAL BACKGROUND

SCRUM³ is a framework in which people can tackle complex adaptive problems, creatively delivering viable products of the highest possible value. Scrum drives innovation, customer satisfaction, performance. Scrum uses radical transparency and a series of formal events to provide opportunities to inspect and adapt the team and its products.

Jeff Sutherland in an update he makes to SCRUM proposes: The Master Scrum cycle (the how) and the Product Owner Cycle (the What), always intersecting these cycles. Together these cycles produce a powerful support structure to coordinate the efforts of multiple teams on a single path.

Delgado (Delgado and Antunez-Maguiña, 2020) propose a system for human resources control using agile methodologies such as SCRUM and Kanban y Loaysa (Loayza et al., 2019) uses Lean. They insist that Peruvian companies are not interested in applying this type of methodologies to include in the textile industry.

Jin-Hai (Jin- Hai et al., 2003) y Potdar (Potdar et al., 2017), present a definition on agile manufacturing (AM), the nature of agile manufacturing is described. It includes the term, real agile manufacturing (RAM), they call it an evolutionary process, developed through management systems and technologies. The key to developing RAM is: 1) it should benefit all partners, 2) multiple winners (manufacturers, suppliers, customers) is the goal. Second, integration (resources, methods, technologies, departments, or organizations) this means RAM reached. Third, IT is a condition and finally core competence is the key. The interesting thing about this research is that they define as successful production the cost of the product

³ <https://www.scrum.org/>

itself that we will consider applying KPI. The exposed conceptualization only confirms the concordance with the agile methodologies that we apply to textile processes.

Manfredsson, y Bruce (Manfredsson, 2016, Bruce et al., 2004), the authors refers to the supply chain and its management using the Lean methodology, considering the elimination of waste as the strong point of Lean in a textile company that produces clothing

With this theoretical basis, we want to show the importance of observing the application of agile methodologies in productive environments, looking at what happens with people and what happens with the results when applying a process that visually shows where and how necks are generated of bottle and the production capacity that the company has.

METHOD

The normal production process of the textile company is observed in the Figure 1, each process is a work area that works independently but related.



Figure 1. Textile production process

The production processes have been analyzed and adapted to SCRUM as an agile methodology that controls management in general. Each production process has its own description, with a beginning and an end. For example, Design involves the following subprocesses: production designs are reviewed, design measurements are adjusted, the production datasheet is filled out, supplies availability is reviewed, and designs are submitted in strokes. While in traces, the process involves: reviewing the size curve, reviewing the availability of inputs, if the inputs are in stock the design scaling is executed, the design scaling is plotted, the design scaling data is recorded, the design is plotted and sent to cut; But, if the necessary inputs do not exist, the process returns to production. In other words, each normal production process involves a subset of subprocesses that the company executes, two of the four processes have been described.

Once all the production processes that the company maintains are known and analyzed, it is planned; the Figure 2 shows the automation diagrams for each of the Kanban boards to be generated, the required lists and the respective backups that will be generated each time.

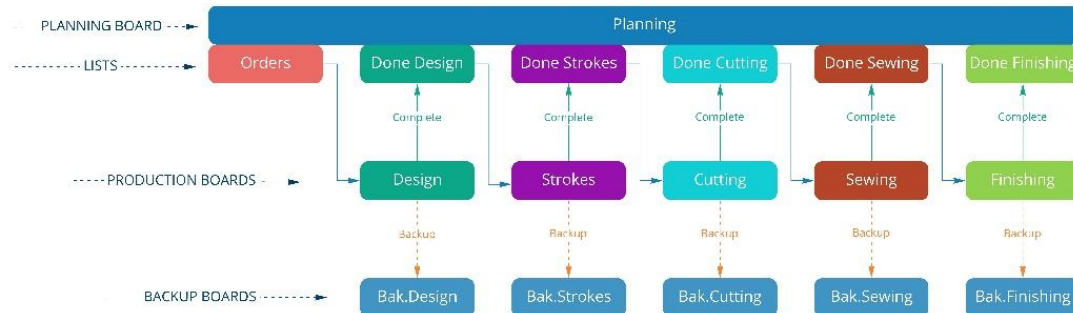


Figure 2 Automatization for dashboards

Additionally, the SCRUM model had to be adapted to the environment and jargon known in the textile company, in the Figure 3, the roles (Product Owner → sales and production manager, Production Operators → Scrum Team) are observed, so that the people who participate in this analysis know where they should intervene. The same happens with the artifacts to be produced (Product Backlog → Proposed Orders, Sprint Backlog → Items to be produced in a Sprint or period, Order Increase → Increase, Complete Orders → Complete product) and the meetings to be held (Planning Meeting of the Sprint, daily meeting sprint review and retrospective). Everything follows the logic established by the SCRUM methodology.

During the development of each Sprint, the team commits to deliver three production orders according to the priority level defined by the sales and production manager. During the Sprint duration, daily synchronization meetings are held, at the end of each Sprint a meeting is held where the fulfillment of order delivery is reviewed and improvements for the next Sprint are analyzed. When the four Sprints are completed, a production closure is carried out in which the fulfillment of the production orders is analyzed through the performance indicators.

Regarding the automation and adaptation of the Kanban framework to the company's production processes, to control where bottlenecks occur and determine the amount of finished production, Kanban integrates it into the SCRUM framework. For this, several boards are generated, to control each work process: Order management production planning, Production centers, Digital documentation. As an example,

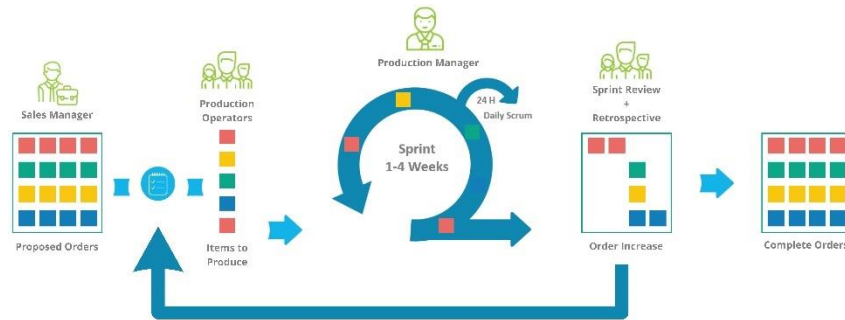


Figure 3 Adaptation of the SCRUM process⁴

Figure 4 shows the Kanban corresponding to the production centers. Normally, the production centers collect the orders to be made according to the designated workload, which will be developed by the production operators (development Team) during the development of the sprint. In the main boards "production center" production is planned and the backups are generated in the backup boards ".BAK". In total, ten boards, thirty lists, and WIPs were developed for each list: these are the boards for design, lines, cutting, making, and finishing. The Trello tool was used to handle the boards, while to automate the movement of the cards between boards, the Butler plugin was integrated, allowing the definition of a workflow for the production processes within the tool.

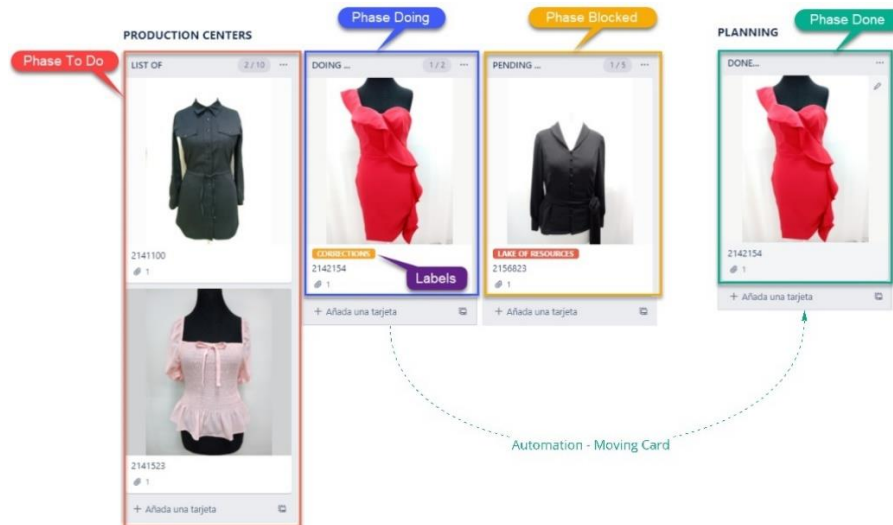


Figure 4 Generic Kanban for production centers

⁴ <https://www.scrum.org/resources/what-is-scrum>

EVALUATION

To evaluate data analytics was applied, integrating productivity indicators in the Trello platform, with Charts addons. The generated indicators were linked to the boards: orders, planning and production centers. The indicators developed were:

- *Sales indicator*: to determine the quantity produced and the value of sales in the period of the experiment.
- *Productivity indicator*: to visualize the status of the different production processes in the period of application of the experiment.
- *Order management indicator*: Orders placed were analyzed with respect to the quantity of production delivered.

Production Capacity Indicator

The company's objective is to increase production capacity, avoiding wasting resources by team members, avoiding bottlenecks, and ensuring the quality of its products. In Figure 5, each line represents a production center.

To analyze the results, the Work in Progress (WIP) metric in Kanban was key in controlling the production capacity for each team. From the results, it is observed that in the month of September, three production centers: cutting, design and clothing achieve a balance, that is, between the three areas the rhythm of work was balanced, that is, the resources work in a balanced way, they do not need to move. ; In this same period it is observed that the bottleneck is in the finishes and the cut; additionally, it was detected that the human resource to establish quality control was not enough, this was corrected in the following sprints. However, in the following period between September 30 and October 28, more was designed than what the plant produced, Likewise, the month of October is better balanced all the production centers and obviously the capacity is being determined real productive company. Table 1 confirms what is explained in Figure 5.

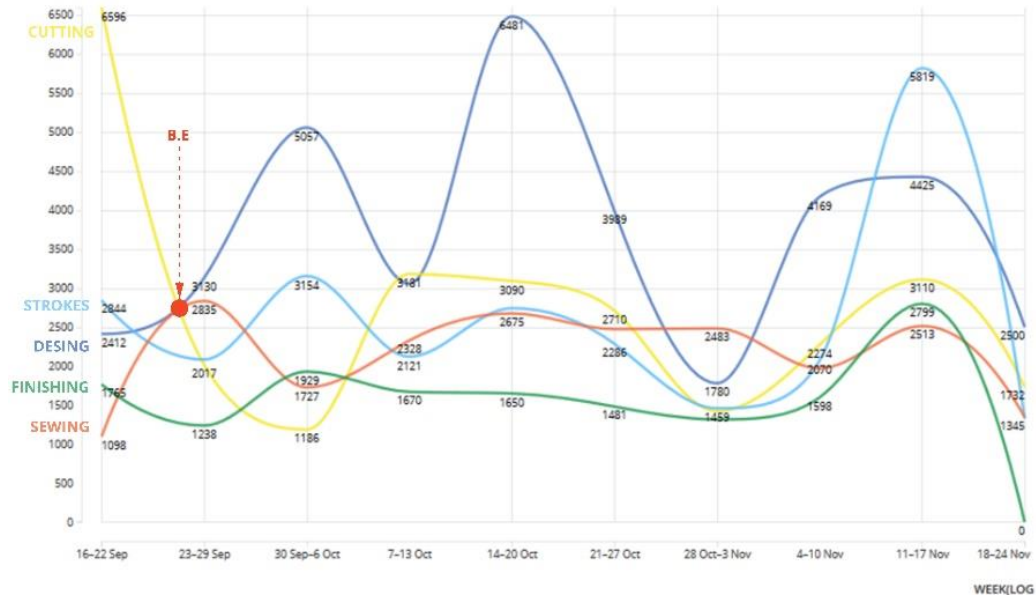


Figure 5 Production Capacity indicator

Table 1 Production Capacity Indicator

DATE	DESING	TOTAL	STROKES	TOTAL	CUTTING	TOTAL
September, 2019	6256	43	5486	32	9035	34
October, 2019	19574	121	10747	76	10530	74
November, 2019	11168	62	9670	65	7753	51
	SUM 36998	226	SUM 25903	173	SUM 27318	159

DATE	SEWING	TOTAL	FINISHING	TOTAL	DISPATCH	TOTAL
September, 2019	4884	28	3003	18	6652	44
October, 2019	9783	64	7488	45	5386	35
November, 2019	6999	53	4955	37		0
	SUM 21666	145	SUM 15446	100	SUM 12038	79

CONCLUSIONS

Analyzing the production processes to be adapted to the SCRUM-Kanban framework requires observing the entire structure of the company, identifying the teams, a clear definition of "Done", defining the MVP, and considering the principles of the methodologies

and putting them in practice.

The proposed scheme can be implemented in other textile organizations or in another production line. To improve the organization of information, the integration of digital documentation was positive as the management of technical sheets was systematized.

The integration of indicators facilitated the analysis of the situation in real time for timely decision making. Indicators make it easy to identify bottlenecks, overloading, poor organization, and lack of planning.

To conclude, agile methodologies in congruence with current frameworks allow optimizing the processes defined by the company and quickly systematizing the organization's workflows.

This work as research on the application of agile methodologies in the industry shows that the organization requires a prior definition of processes, which should be considered as guides in the implementation of the chosen agile methodology.

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