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Optimizing Consequences Given to the Decisions of the Financial Jurisdiction by LEAN Methodology: Injunctions for the Future VSM

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***Abstract*—the current VSM (Value Stream Mapping) allows to mount the future VSM and also the action plan. The current mapping of the judicial activity of the audit court has already been treated by the same authors. This study will address the future VSM according to the methodology used in the industrial sector. The projection of the issue of the IPA (Injunctions for the future) over a few years concludes that the repetition of the issue of an injection of the same accountant or on the same account is inevitable from the year 2025. The behavior of the future VSM has been modeled by a sigmoid function by adopting a mechanism with a Poka yoké filter to limit the repetition of the IPA. Only in this case that the financial jurisdiction does not interfere in the rule of legislator but pursues the legitimate aim protected by the constitution. This solution is materialized by the use of the centralized register at the level of the rapporteurs, the prosecutor of the office, and the deliberative formations. A program installed in a server can replace the registry. A method of Java Programming is presented in this study. It has been used to simulate the advanced result. LEAN is thus applicable in a service environment even if it is still in a development phase.**

Keywords— LEAN, VSM, financial jurisdiction, Injunction, filter.

I. INTRODUCTION

The engineering methodologies have been used especially in the industrial sector for a long time. The LEAN healthcare started to take its place in the hospital sector especially in the Quebec health centers. The public sector of the United Kingdom and the United States have already applied some steps of LEAN in order to get advanced the improvement and the change in the public administration level and there is also The same for the Brazilian jurisdiction federal. The particularity of the actual study stays in the transposition of those methodologies to optimize the consequences given to the decision of the financial jurisdiction.

This publication is the next consequences of the publication by the same authors who have made the actual VSM [1]. In the actual publication the future VSM will be written. The improvement of the task is not working well in the actual study. It is just limited in the consequences given of the injunction for the future (IPA). As in the first publication this study gets through the visible efficacy for a short time of the Malagasy financial jurisdiction by optimizing the consequences given of that jurisdiction decisions.

But at least some of the decision will be ready for the execution comparing to the unfinished pedagogic task. In other way the financial jurisdiction decision should be stricter. But as a decision to be followed by its execution the court should install a device to avoid the IPA repetition.

II. MATERIAL AND METHODS

A. *LEAN management*

The use of the LEAN methodology in a service constitutes the particularity of the actual publication. The LEAN is an industrial method used by the TOYOTA Company in order to make lighter its organization and to focus on well in the real task. This method has been transposed in the service sector for raising the performance service.

The LEAN thinking is also created for gathering the application of this method in the non-industrial sector. However it is not spared by the serious critic. According to Burgess titled "Evaluating LEAN Healthcare" in 2013[2]; none solid proof in the improvement of the company's performances is getting better during the LEAN application in the organization. Burgess talked about the non-evidence of the positive effect of the use of the LEAN manufacturing of the services environment [3]

According to RADNOR, there were just a few proofs quantitative of the result [3]. In general it was seen that LEAN's work has improved the customer's services and the most important is that the LEAN's work will have some unfinished impact. Therefore there was no proof in their claims.

In fact it was criticized that:
-The result of the study was decreased
-The old support was not used for awhile
-Some bad result published
-The creation of the add value is badly-justified
-The Profiling of the concept is not dig
-The result in knowledge of the reality and the LEAN result not seen
-The LEAN is badly translated.
-The indicator is badly known
-The result of the LEAN company is badly separated by the others intervention and badly quantified.

The LEAN thinking is in the "robustness" phase. The LEAN service in the real jurisdiction in England is pointed in the Justice access.

Started in 2006 by some jurisdictions (Judges, Supreme Court, Royal court, Accountant court, and the Appeal court in England and Wales), in December 2011, all of the trial of England and Wales was finished. It was the staff of NCSM

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(Her Majesty's Court Services) who has followed training through the LEAN academy [3]. Pamela Mazzocato, Carl Savage, Matts Brommels, Hakan Aronson and Johan examined 33 publications in 2010 and they made an issue in an article titled: "Thor LEAN thinking in healthcare: a realist review of the literature". According to the authors they found out a large LEAN application, all of the articles brought some positive result [4].

Nicolay CR, Purkayastha S, Greenhalgh A , Benn J, Chaturvedi S, Phillips N, Darzi A. Nicolay have studied in 2012 some job involving the LEAN thinking. An article titled: "systematic review of the application of quality improvement methodologies from the manufacturing industry to surgical healthcare" was published in this effect. According to those authors the methodology QI (Quality Improvement) of the industry can have some significant effect in the surgery healthcare: decreasing of the rate of the infection to the efficacy increasing of the operation room. The proof is generally in under-optimal quality and some multicentric studies randomizes are need for getting back the management lead by some proof in the same branches than the medicine lead in some proof [5]. Dellifraine, Jami L, James R. Langabeer and Ingrid M. Nembhard in an article titled: "assessing the evidence of six sigma and LEAN in the Healthcare industry" in 2010 has made in advance the applicability of the LEAN things out the industrial activities. The authors developed that the things of improvement of the quality of the methodologies LEAN more than six sigma and LEAN can be used in the health sector. The use of those staff got an opportunity for the hospital administrations to improve the care quality in their establishment [6].

The article of Joshua R.Vest Larry D. Gamm in (2009) titled "critical review of the research literature on Six Sigma, LEAN and Studergroup's hardwritting excellence in the United States: the need to demonstrate and communicate the effectiveness of transformation strategies in healthcare", say that the LEAN makes better the clinic care and the prices less increased for the users thanks to the training of the staff and the behavior of the leader's attitudes [7]. The article of Justin M. Glasgow, Jill R. Scott-caziewell, Peter J. Kaboli titled: "guiding impatient quality improvement: a systematic review of LEAN and six sigma" develop the LEAN methodology ad six sigma. It is an article considered as the system report of 539 articles potential in this subject. The study is based on the Quality Improvement (QI) of the care in the hospital. They have considered that the studies effectuated are almost punctual. They are not very limited as they don't exist generally and the files are followed in an acceptable deadline. The real impact of their surrounding are difficult to judge; as the lack of evaluation rigorous or the improvement clearly helped created some applied proof of adoption.

The article of Holden titled: "LEAN thinking in emergency department: a critical review" effectuate a critique analyzed of the old literature about the implantation of the LEAN in the Emergency services. The LEAN can get ahead when the conditions needed are gathered. The LEAN methodology should be compatible with the context [9]. The article of Bozena Poksinska in 2010 titled: "the methodologies LEAN implementation in health care: Literature review" examines the implantation of LEAN in health care. This study shows us that LEAN is used in health care as processes of improvement. Value Stream Mapping is the thing of LEAN which is often used in the health care [10].

B. Value Stream Mapping

The use of the VSM or Value Stream Mapping derived by MIFA (Material and Information Flow Analysis) of Toyota needs some steps.

-Define the perimeters

-Prepare and raise the VSM "present state"

-Raise the VSM "future State"

From the present VSM the establishment of the future VSM is possible. The waste can be the same or not. But the indicator has got some ways to warrn the dysfunction and the lost in the system. We finally need to draw down the next flux and recount the new rhythm of the product, the ratios and the indicators comparing to the present states.

-Raise the plan of the action

The comparison between the present states and the future states let identity the project that will make sure the success of the improvement to the future state. Those LEAN projects will take place after the priority fixed by the organization responsible by taking count the resources available. The most critical processes are the most affected by the projects. But the use of the thing for rationalizing the choice can make sure the success of the use of the VSM staff.

Talking of the files manipulate in this study, the research is just for the superior accountant of treasure who give back directly the evidence in the court who are roughly 30 accountants. The typology of the anomalies identified drug the inside work of the court let as well free a level which is equal of 28.

C. The use of the informatics staff

This study is the result of the software Scan Davis and the result of the data done by the Java program.

Matplotlib is the best package of python for manipulating the graphs by the intermediate of the pylab interface that brings back the matplotlib easier to exploit such as MATLAB. The use of the one software integrating the python, NumPy and Matplotlib, make sure the good result. The software ERIC6 compiles the script in our case. For the simulation, Java was used to generate random data. At the end of the program, the simulation generates a 12 120 lines CSV file (Comma Separated Values) to enable analysis of the filters in the system.

This study has used the ScanDAVis software (scientific Data Analysis and Visualization) in order to modelise the future behaviour of the emission of the injunction for the future. The ScanDAVis is a scientific staff open-source for underlining and analyzing the numerical data. The development has started in 2007 by Tilman Benkert and Knut Franke as a derivative of Qtiplot, a clown of the original programmer. This software allows the sigmoid adjustments function. The use of the Scan Davis let the data inserted in the experiment and elaborated the graphic from the table to enter some equation and get the theoretical equations and experimental [11].

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Opening the software ERIC6 (Python): we have to make the script in order to get the logarithmic regression. This step will get out A and B which is based only in the starting 1. Although the formula get in Y=a.ln (X) +b is adjusted by (X- 2006) since the data starts in 2007. We should dial the A the result of A is seen and the same for B.

TABLE I. SUMMARY OF THE PYTHON SCRIPT

```
#!/usr/bin/env python
# -*- coding: utf-8 -*-
from pylab import *
from numpy import*
P=np.array([2007,2008,2009,2010,2011])
Q=np.array([228,399,456,510,567])
n=5
R=P-2006
sommexi=sum(R)
sommeyi=sum(Q)
sommelogxi=sum(log(R))
sommelogxiyi=sum(log(R)*Q)
sommelogxi2=sum((log(R)*log(R)))
A=((n*sommelogxiyi)-(sommelogxi)*sommeyi)/((n*sommelogxi2)-
sommelogxi*sommelogxi)
B=((sommeyi-A*sommelogxi))/n
……
```

a. *Source: Authors*

Opening the ScanDAVis software. There is a data sheet whose header is 1 [X] 2 [Y]. We have to write down the data or paste after their sources by clicking in the right button of the mouse and then click in graph. After that we have to click the left button of the mouse in the "graph" and then "add a function".
Data collection in ERIC6: We have to come back into the ERIC6 for copying the value of A and B then paste in dialog box and elaborate the formula under the form of:

$$Y= A.\ln (X) +B \quad (1)$$

which is:

$$Y= 203.59032 \ln (X-2006) +237.06261 \quad (2)$$

The construction of the polynomial adjustment: We have to check of 2007 to 2050. And after that the echelon adjusted herself automatically. We have to click after the right button of the mouse, in the "curve" and then the F1 (the name is inserted function). Afterward we have to change the style in order to distinguish the curve. A click in the worksheet let the logical to generate the point X and Y coming to logarithmic curve in the considered period that is to say from 2007 to 2050. From 2025 where our future asymptote who is about 840 is touched, the data will stay constant by imposing the last value. In the actual study this value is about 839, 1030953631753. It's possible to despise the worksheet in order to see the graph. After that we have to dial the right button of the mouse and then add or delete a curve then add a curve-data in the content. Push in the left button of the mouse then click in "analysis" and then in "Polynomial adjustment". Choose the adjustment of "curve-data". In the dialog box, we have to make sure that there is a curve-data; we have also to change the polynomial's order. In our case the order "9" is made for the calculation in the computer. As there are some precision comparing to the "curve data" but the determination of the roots of the second derive seems impossible manually. In fact the roots of the second derive are determinable easily. The methods of resolution of the polynomial of the degree 4 are nowadays available. This calculation let to determinate the inflexion points, element of sigmoid function.
The sigmoid function's creation: A creation like in the polynomial adjustment is needed; the same step will be applied unless the created polynomial during the current step is used here in the place of the curve data. We have to change the year after in order to cover more years. We also need to find the center by changing the year of 2006 till 1980. The function which has a coefficient of determination the most high with the polynomial will be the wanted value.

III. RESULTS

A. *Jurisprudential creation of the injunction for the future*

Talking of the legislation in Madagascar, the injunction for the future is a decision of advertisement of jurisprudential creation in order to avoid the recidivism of the future. "Under the circumstances it might be possible that the judge have to choose to make the pedagogies instead of giving some responsibility of the accountant in cause" [12]. The jurisprudential consecration of the injunction for the future is justified by the inefficacy of the present mechanism in order to protect the accountant against the dysfunction of the system. In fact the accountant should be sanctioned because of her fault not because of defiance of the system. However the court should be objective and sanction all irregularity by knowing that it is really a problem of a big span not a particular problem of the accountant.

The guarantee of non-repetition avoids the impunity. The reproduction of the act incriminate is sanctioned by a final decision. The budgetary actors are trying to conform to the regulatory and legislatives dispositions and to improve their management. In maximum the cumulus of the injunction for the future shouldn't be under 840 in the present study case. This number corresponds in the number of the accountant post which is around 30 and the number of the anomalies types are around 28. The injunction's repetition of the future for the same anomaly in the same accountant should conduct into a exceeding of this ceiling. In this case the judge's share with the parliaments the legislative power even though it's not about a political of a punctual control but about a permanent absolution [1]. The existence of the other typology of anomaly non repertoire will increase this number. It is the same for the augmentation of the paste of the accountant and the admission retired by the accountant. But the study counts just this number approximate which has a ceiling for the emission of the injunction for the future.

Average IPA is the average number of IPA issued per account. The decisions for the 2007 financial years comprise on average 4 injunctions for the future. As it turns out, there are 3 IPA on average for the 2008 fiscal year and 3 for the 2009 to 2011 fiscal years. Only 10% of the producer accountants are at the same time of the accountant titular of the account. Almost 2 accountants are also concerned by an account for the exercise 2007 that gives 108 accountants in addition.

TABLE II. ESTIMATION OF INJUNCTIONS FOR THE FUTURE

	Year				
	2007	2008	2009	2010	2011
Cumulative	228	399	456	510	567

b. Source: Authors

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The average IPA is from the majorities of the unity of the available data in the court which has some lack. In fact some decisions are already notify? Some left non- written but already delivered, some are inaccessible.

The publication in the actual VSM has get out the function Y=203.59 ln(X-2006)+237.06 from Matplotlib. A number of injunctions for the future which is equal of 46 for the exercise 2011 and in maximum of 37 for the exercise 2012 should be taken in account by the VSM.

B. Future VSM and the action plan

In this study, the VSM actual is checked in order to result to the future VSM presented in this following figure. The future VSM has in addition some measure to be taken in the concerned task. It's about our case the adoption of the filters in each keys process. In the elimination subject of the non-quality or default, the repetition of the injunction for the future for the same anomalies for the same accountants which has some non-quality. The missing of the filter exactly in the level of deliberation, increase the defaults apparitions. The application of the filter before the deliberations can be also efficient. But this option let the firm injunctions requalified to injunction for the future during the deliberations. It's about material of elaboration of a list of injunctions for the future as being among the black list.

A System anti-error should be installed in the system. It's a keying system in order to avoid the production's defaults. According to Shahin Arash and Ghasemaghaei Maryam, it's about conceiving the processes of production in order to specify the error shouldn't produce itself. The concept has firstly invented and practiced by Shingo in Toyota and often used as a tactic intuitive and with a low cost in the implementation of TQM (Total Quality Management) in the environment of fabrication. However in the services sector it's getting difficult to put a statistic measure in the intangibles aspects [13].

In the present study, the filter is a register that the member of the jurisdiction should refer during the emission of injunction for the future. A software installed in a server can be also replaced this register in front of the dematerialization croissant of the public busyness. The use of one language Java seems worthy comparing to the other languages especially when it's about an application by Internet.

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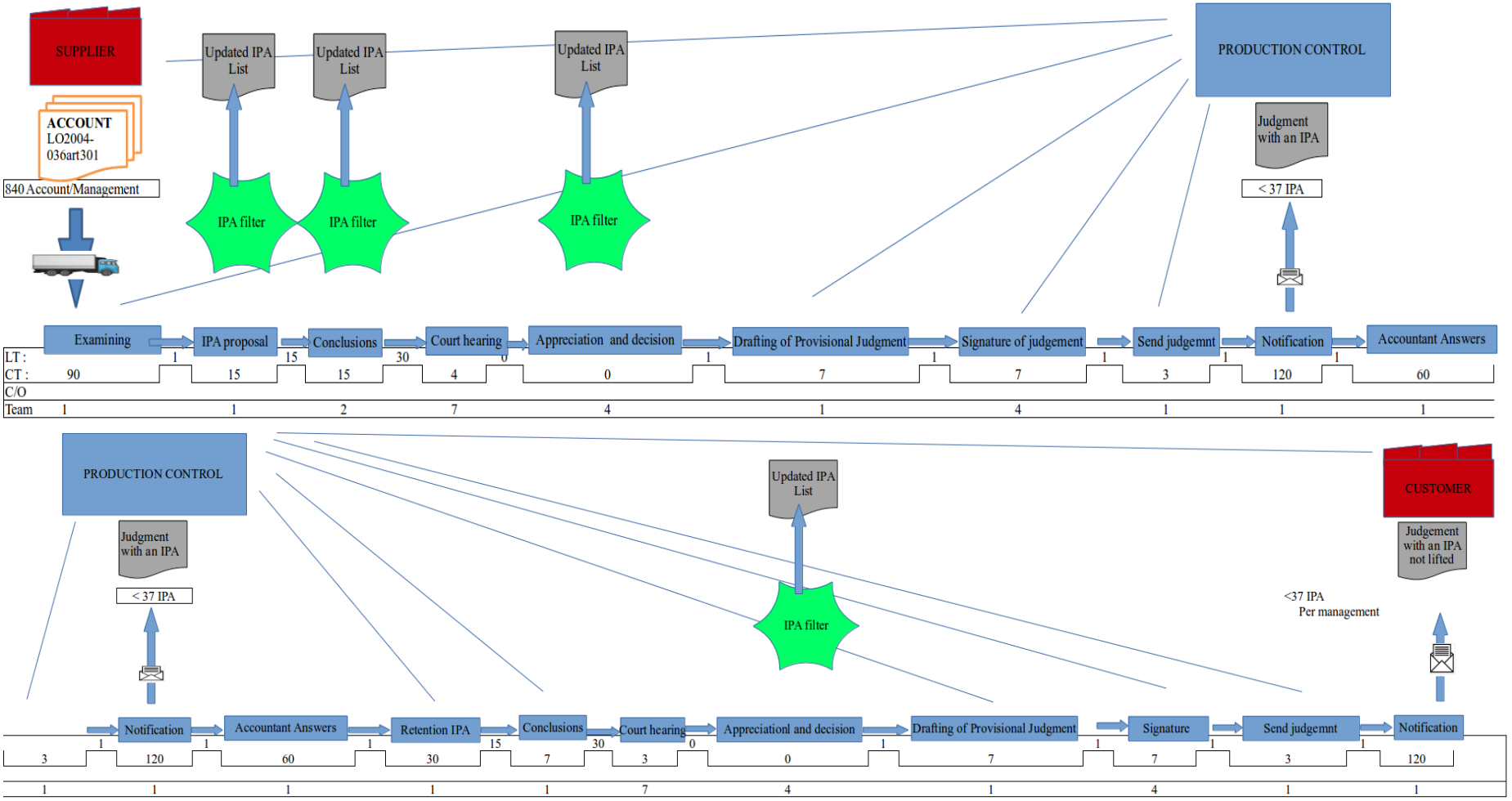

Fig. 1. The Value Stream Mapping

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According to this Fig.1, the solution is to mount filters at the process level. The first filter is at the instructor level. The second filter is at the parquet floor. The third and the fourth are at the level of deliberation formations. Filters are the reconciliation of an IPA proposal with a centralized file of lists of accountants and accounting positions already displaying IPA. The relevant anomalies are also shown in the table.

The following table shows a method of a Java program used when simulating the filter in question. The method presented in this table is an example of filter used during a simulation.

TABLE III. SUMMARY OF THE JAVA PROGRAM METHOD

```
……..
        int q10=0;
        for (int q=0;q<tir;q++)
         {
         Random piso = new Random();
         int paiso = piso.nextInt(tirmax);
         boolean pomo1= sivana.contains(paiso);
         boolean pomo2=poma699.contains(paiso);
         boolean pomo3=poma799.contains(paiso);
      if(pomo1==false && pomo2==false && pomo3==false)
         {
         sivana.add(paiso);
         }
……
```

c. *Source: Authors*

The method presented in this table n°3 is a method of Java programming when issuing an injunction for the future. The method retrieves 6 parameters including arrays. In the case where the IPA is already issued in an accounting item (poma699) or an accountant (poma799), the program avoids reissue. But other anomalies can be observed, which is the case during the simulation.

C. The future model of IPA

It's from the adjustment Boltzmann Sigmoid fit that this study has developed the model. The function is in the form of :

$$Y = \frac{(A1-A2)}{1+e^{\left(\frac{(X-X0)}{Dx}\right)}} + A2 \qquad (3)$$

Constructed by Evenberg-Marquardt's iterative algorithm with a tolerance's threshold of 0.0001. It is a parameter function comparable to a logistic function [14]. In our case, there were 13 iterations to clear the minimum. This is the fitting of a new curve from the ninth degree polynomial algorithm by imposing an asymptote constraint y = 840. The following figure shows the model of the emission of IPA with filter

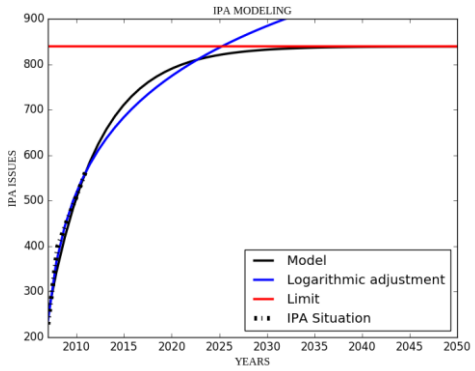

Fig. 2. The projection of the IPA with filter

According to Fig.2, the field of study of this function is between x = 1 989 to x = 2 050.
A1 is the initial value which is equal
-55 260.9199993156
A2 is the final value which is 839,338568181393
X_0 is the center which is 1 983.30336176684
D_x is the time constant which is about (+/- 1.50490758651199e-155) of 5.21252302252151
In our case the coefficient of determination of the new curve with the polynomial is:
$R^2 = 0.99997645618792$.

We thus have a function that models the future behavior of the issuance of injunctions:

$$Y = \frac{(-55\,260.91 - 839.33)}{1+e^{\left(\frac{(X-1983.30)}{5.21}\right)}} + 839.33 \qquad (4)$$

There is infinity of function which passes in the point forming the sigmoid function. However the comparison of the coefficient of determination let this study to get out a function that registers the highest coefficient. The year 1989 is for this following figure the highest point.

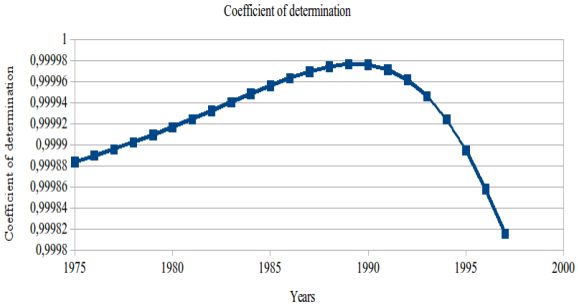

Fig. 3. Projection of the IPA with filter

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According to this fig.3, the coefficients increase from 1950 to 1989, but a downward trend is recorded from 1990 to 1997. From the year 1998 the algorithm can no longer find a logical inflection point to form a sigmoid function.

IV. DISCUSSIONS

A. The effect of the existence of a follow-up mechanism on the follow-up given to the decisions of the financial court

Reproduction of an injunction for the future for the same anomaly to the same accountant constitutes a kind of manufacturing defect. The adoption of the list of IPA by including the anomalies and the accountants concerned makes it possible to filter the injunctions for the future. In case of recidivism, the Court must issue a firm injunction. The decrease in IPA may in some cases result in an increase in firm injunctions. Members of the Court should refer to the list before proposing or deciding on an IPA. This step will then be added to the check that the rapporteurs should make. Reproduction of IPA will be limited and even impossible if such a list is adopted. The production defect decreases until complete elimination of manufacturing defects. The filter would be subject to updating according to subsequent decisions taken by the Court.

The cumulative number of injunctions for the future in 2011 is greater than 500. The number 840 is here the IPA emission ceiling. This leaves around 300 injunctions so that all of the accountant is concerned in the future with any anomaly. If, for example, the Court has issued injunctions for the future at the same level as in 2008 for 2009 and 2010, the ceiling is reached. The implementation of a filter at the level of the monitoring mechanism is thus necessary to limit the repetition of IPA.

The provisional nature of the injunctions for the future is confirmed. Indeed, the jurisprudential creation of this sanction does not constitute an interference with the legislative power. This is the application of "criminal policy" at the level of the financial jurisdiction. The penalty for the future is strictly limited by time to achieve a more legitimate goal that is good financial governance. The cumulative equivalents of IPA should not exceed around 840. Exceeding this ceiling means that there will be recidivism and that the jurisdiction should recheck. The existence of a follow-up mechanism on the follow-up given to the decisions of the financial jurisdiction will make it possible to avoid the non-quality materialized by the non-repetition of the injunctions for the future.

B. Simulation

The program generated 12 120 data in this simulation. It is a Java program that has 5 principals' methods. The program simulates the change of accountants, the issuance of IPA and especially the efficiency of the filter. According to Bourouis Abdelhabib and Belattar Brahim the choice of the programming language is crucial; it must allow the interruption, the suspension and the resumption of execution of the processes. Simula was the first language that introduced the object-oriented paradigm in programming. He served for a long time as a support. Currently, it is the Java programming language that takes over which is perfectly adapted to the notion process [15].

An average of 2025.56 was calculated from these data and a standard deviation of 0.61. It is thus that the Court should no longer be able to issue an injunction for the future from the year 2025. After the discretization [16], the following table is thus used in this study.

TABLE IV. IPA EMISSION SIMULATION

years		Freq	$(X\text{-}Av)^2$	$(X\text{-}Av)^2 * F$
2019	2020	0	36.82	0
2020	2021	0	25.68	0
2021	2022	0	16.55	0
2022	2023	0	9.41	0
2023	2024	38	4.27	162.44
2024	2025	1736	1.14	1978.54
2025	2026	7749	0	35.,38
2026	2027	2563	0.87	2228.32
2027	2028	34	3.73	126.,97
2028	2029	0	8.6	0
2029	2030	0	15.46	0
Total		12120	122.54	4531.66

d. Source: Authors

According to this Table IV, the data are generally between 2023 and 2027. Dispersion around the mean is thus noted. The year 2025 corresponds for this following figure to the head of the normal distribution.

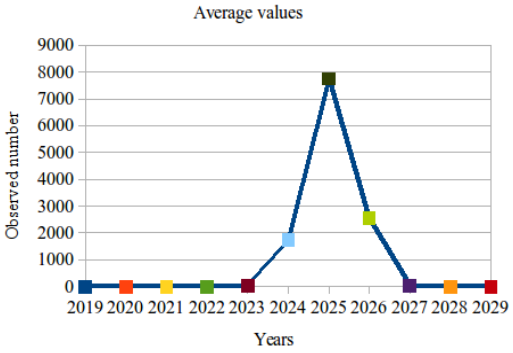

Fig. 4. Dispersion of observed data

According to this Fig.4, the projection of the IPA with filter follows the Normal law. For the 1 Sigma step, there are 12 048 numbers observed. This figure represents 99.41% of the population that equals 12 120. Compared to the normal distribution, this percentage should be above 68%. For the 2 Sigma step, this percentage is 99.41% while the reference is 95%. The 3 Sigma step displays a 100% percentage for this simulation, which should normally be greater than 97.7%. Even step 6 Sigma is respected here (99.9999998%).

V. CONCLUSION

The behavior of the future VSM has been modeled by a sigmoid function by adopting a mechanism including a filter to eliminate the repetition of the IPA. In 2025, the issuance of an injunction for the future should result in at least one repetition of the issuance of an IPA. Members of the Court should refer to a register which displays the list of IPA issued on an

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accountant and an accounting item. This register thus constitutes a filter for the system which makes it possible to avoid the defect in the production. It is therefore a key to assimilate a poka yoké. It turns out that LEAN Thinking is a reality. Its development cannot be stopped in the same way as LEAN manufacturing.

The elimination of wastes is an open field for other researchers. The timing of the tasks to adjust them with the time also seems the logical continuation of this study. But all these techniques come under the LEAN methodology.

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