ROMANIAN ECONOMIC AND BUSINESS REVIEW

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CONTENTS

ACCOUNTING IMPLICATIONS OF ONLINE COMMERCE

Lucian Constantin Gabriel Budacia[*]

Abstract

Online commerce is a truly dynamic sector, which is constantly evolving and will continue to undergo structural changes. The current social and economic context is favourable to the expansion of online commerce; the era of the pandemic generates new modifications and tendencies in online commerce. The expansion of online commerce, the health crisis, the organizations', consumers' and employees' need for reorientation, the work from home, all these are the premises of the exponential growth of online sales.

Key words: online sales, online commerce, the accounting of online commerce operations

JEL Classification: M 41

Introduction

Online commerce is a truly dynamic sector, which is constantly evolving and will continue to undergo structural changes, as it already displays certain tendencies regarding its future evolution. In principle, the predictable tendencies could be the following:

- strengthening of the current position as an intermediary in the commercial sector, in general;
- search and supply of new solutions concerning the improvement of the online sale process;
- directing online commerce towards the massive transformations, changes, modernisations which take place in the economy, in general, but also creating or developing big organizations focused on online commerce.

The current social and economic context is favourable to the expansion of online commerce; the era of the pandemic generates new modifications and tendencies in online commerce. Some of these are analyzed on the Pwc Romania Blog (2020): the severity of the impact of COVID-19 on the retail sector depended on the areas in which companies operate, such as the food industry, fashion, furniture, electronics, and on the expansion of the store network. While the non-food retailers are confronted with the closing of their shops and massive losses of their revenues during this time, hypermarkets and supermarkets have everything to gain, shifting from panic driven shopping to the stabilization of operations, maintaining supply chains and developing new channels, such as online commerce and home deliveries. Unlike non-food retailers, who had a wider experience online, for many of the supermarket and hypermarket chains, e-commerce was only in its beginning stages and this crisis accelerated their plans for digitalization. (Ruxandra Târlescu, Mihai Anița)

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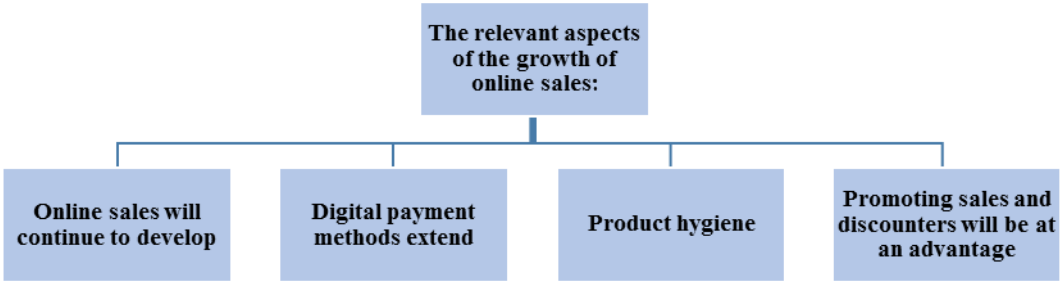
The traditional way of carrying out the distribution changed under the influence of the internet. New types of shops emerged, called cyberstores, virtual stores or online shops. In order to enhance the comfort of shopping for clients and benefit from the amplification of the attractiveness of the product range through reuniting many virtual shops, online shopping centres were created. A virtual shop is practically a website through which products are presented in detail, in order to be sold. If a website presents products, but does not allow buying, then it is not a virtual shop, but rather a catalogue of products. (2013)

The expansion of online commerce, the health crisis, the organizations', consumers' and employees' need for reorientation, all these are the premises of the exponential growth of online sales. Thus, a series of relevant aspects are emphasized:



a) Online sales will continue to develop

The fear of the pandemic, the necessity of avoiding physical contact and overcrowding, the development of the work from home will determine the massive and long-term expansion of online sales and home deliveries.

b) Digital payment methods extend

In order to minimize the risk of spreading the virus through money, it is highly recommended to pay without cash, even small sums. Once consumers get used to payment methods without cash, they will continue to use them after the pandemic. Moreover, the new technologies, such as "scanning during shopping" or "self checkout", will not only be frequently used, but also preferred on the long run.

c) Product hygiene

The health crisis generates new expectations regarding product hygiene. Fearing an infection, clients tend to avoid unpacked or in bulk products etc. Therefore, many online traders wrap the delivered products in a safe manner, specifying this on the parcel, which gives them a competitive advantage.

d) Incentive sales (promoting sales) and discounters will be at an advantage

Unemployment in certain areas of activity, reduction of the purchasing power, expansion of the work from home will direct consumers towards discount stores and websites which have a product range at low prices and under private brand.

Accounting aspects regarding online sales

We take into account the following example: Company A is in the business of online clothing commerce. The displayed prices include the mark-up and the VAT.

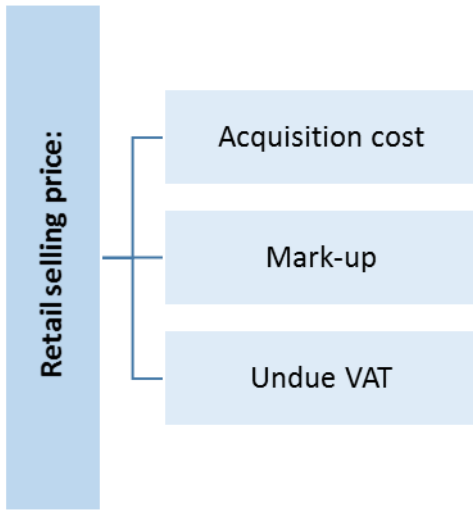
- On February 8, 2021, the company gets its supplies from an internal supplier, with goods up to 20,000 lei, VAT 19%, in order to resell them on its website.

%	=	401 "Suppliers"		23,800
371 "Goods purchased for resale"				20,000
4426 "Input VAT"			3,800	

■ Paying the debt to the supplier:

401 "Suppliers"	=	5121 "Cash at bank in lei"	23,800

■ The calculation and emphasis of the price differences at purchased products, taking into account the following chart:



- Mark-up = 20,000 lei x 30% = 6,000 lei
- Undue VAT = (20,000 lei + 6,000 lei) x 19% = 4,940 lei

371 "Goods purchased for resale"	=	% 378 "Price differences on goods purchased for resale"	10,940 lei 6,000 lei
		4428 "VAT under settlement"	4,940 lei

- There is a record for the month of February, of sales with a value of 10,000 lei, VAT 19%; the value of the transport made by a courier company is of 750 lei (there were 50 parcels x 15 lei/ parcel), given the fact that the cashing in is made by the courier company (cashing in when the goods are delivered).

- Selling the merchandise:

4111 "Customers"	=	% 707 "Sale of goods purchased for resale"	12,792.5 lei 10,000 lei
		708 "Revenues from sundry activities"	750 lei
		4427 "Output VAT"	2,042.5 lei

- Writing off the sold merchandise:

%	=	371 "Goods purchased for resale"	15,076 lei
607 "Goods for resale"			10,000 lei
378 "Price differences on goods purchased for resale"			3,000 lei
4428 "VAT under settlement"			2,076 lei

- Recording the reimbursement invoice by the transport company for the sums cashed in from the clients on behalf of company A with a value of 750 lei:

461 "Sundry debtors" / courier	=	4111 "Customers"	750 lei

- Cashing in the reimbursement invoice from the courier:

5121 "Cash at bank in lei"	=	461 "Sundry debtors" / courier	750 lei

- Settlement regarding the transport with the courier company, at the end of the month, based on an invoice with a value of 300 lei:

% 624 "Transport of goods and personnel" 4426 "Input VAT"	=	401 "Suppliers"	300 lei 252 lei 48 lei

- ■ Paying the supplier of transport services:

401 "Suppliers"	=	5121 "Cash at bank in lei"	300 lei

Conclusions

Online commerce also has a series of fiscal implications which differ from one country to another. In the case of an acquisition within the European Union, the Romanian buyer has to follow the same rules as the citizens of the state from which the acquisition is made. Thus, the VAT rate from the respective state is applied. In the case of an acquisition from outside the EU, the seller has to sell the product without taxes and the Romanian buyer will pay the taxes for the import.

In our country, the tendency to buy products online is increasing, which is a natural aspect within the current social and economic context of the pandemic. The strong development of online commerce has a negative impact on the activity of big shopping centres, but even in this context, Romanian consumers are cautious when it comes to spending money in this manner as compared to consumers from other states. The social and demographic segment that is the most opened to such purchases is the one that uses the internet intensively.

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EFFECTIVENESS OF MONETARY POLICY AND INTEREST RATE PASS-THROUGH IN INDIA SINCE FINANCIAL SECTOR REFORMS

N. Kubendran[*]

Abstract

This article tries to investigate how monetary policy and interest rate pass-through is effective in India after adequate autonomy was given to commercial banks through financial sector reforms and Banking Sector Reforms. The study uses Milton Friedman and Robert Mundell's perspectives on the role of monetary policy in achieving internal and external sector equilibrium. For this purpose, the study uses ADF-PP unit root test, Engel Granger's Causality Test and trend line analysis. The study observed that the monetary policy is effective in influencing major macroeconomic variables like GDP, Exports, Imports and Capital Flows. Similarly, the Reserve Bank's Lending Rate and Commercial Banks Prime Lending Rates are directly correlated in the entire study period. But the study did not find any causality between money supply with current account deficit and exchange rate lacks significance of monetary policy in the context of automatic restoration in the external sector. The overall conclusion of the study is that the monetary policy is very effective in influencing major macroeconomic variables via strong interest rate pass-through in India even after adequate autonomy was given to Commercial Banking Institutions.

Keywords: Money Supply, Interest Rate, Monetary Policy, Capital Movements, Granger Causality

JEL Classification: E43, E51, E52, E58, F21

1. Introduction

India revisited the macroeconomic policymaking process since the Balance of Payments crisis of 1991. Before the BOP crisis, almost all the sectors and institutions were directly controlled and regulated by the government and the RBI through appropriate Fiscal and monetary policies, popularly known as inward-looking strategy. After 1991, when the government introduces the outward-looking strategy known as Liberalization, Privatization and Globalisation (LPG), role and the effect of macroeconomic policies on the economy differ drastically. Especially, the effect of monetary policy on the economy invalidates several theoretical relationships. This is mainly because of the government of India undertook major reforms relating to the functions of the money market. The first reform measure was introducing the recommendations of the committee on the financial system in 1991 and the other is

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banking sector reforms in India in 1998. Both the reform measure delivers adequate freedom in the operation of financial institutions in the money market, especially Nationalised Commercial Banks (NCBs) enjoys more autonomy through deregulation of interest rate and so on. As a result of this, the commercial banks did not respond properly to the RBIs rate cut on several occasions which nurtures serious concern on the effectiveness of monetary policy in India.

Theoretically, the role of monetary policy is an important tool to achieve internal as well as external sector goals. Suppose, if the central bank increases its money supply marginally, it will increase the price level and decrease the interest rate. This, in turn, will have a positive impact on the nation's GDP without creating inflation. Similarly, the explicit control of the quantity of money by the government and the explicit creation of money to meet fiscal deficit will influence inflationary effect in the economy. This problem cannot be rectified with fiscal discipline. Instead, eliminating government control on the quantity of money with the balanced budget will provide a solution to economic fluctuations.

Likewise, monetary policy works well in the external sector, especially the Balance of Payments front. The Balance of Payments problem is always and everywhere a monetary phenomenon (Harry G Johnson, 1974). According to Johnson, an increase in money supply which will lead to creating a deficit in the current account as well in the capital account. It can be stated as:

$$\uparrow MS \rightarrow \uparrow D \rightarrow \uparrow I \rightarrow \uparrow GDP \quad (1)$$

$$\uparrow MS \rightarrow \uparrow P \rightarrow \uparrow M \,\&\, \downarrow X \rightarrow -CAD \rightarrow -B \quad (2)$$

Similarly

$$\uparrow MS \rightarrow \downarrow i \rightarrow \uparrow Kout \rightarrow -KA \rightarrow -B \quad (3)$$

$$-\,\mathrm{CAD}\ \&\ -\,\mathrm{KA} \rightarrow -B \quad (4)$$

Where, MS = Money Supply, CAD = Current Account Deficit, Kout = Capital Outflows, M = Imports, X = Exports, P = Price Level, i = interest rate, KA = Capital Account B = Balance of Payments.

Just the opposite case will occur when the central bank of the country decreases its money supply.

So monetary policies can be applied to improve or correct disequilibrium in the Balance of Payments under fixed and flexible exchange rate systems. Under a fixed exchange rate system, the BOP is highly monitored and controlled by the Central Bank via accommodating flows. Whereas in the flexible exchange rate system, market forces play a significant role in determining the exchange rate, which in turn corrects BOP disequilibrium automatically through autonomous flows.

In the present scenario, the majority of the countries are following either a flexible exchange rate system or a managed float exchange rate system. So, the present study tries to test the relevance and effectiveness of the monetary policy on major macroeconomic indicators by correlating the RBIs lending rate with commercial banks' lending rate since the reforms in the Indian money market.

Eminent economists like Milton Friedman, Harry Johnson, Mundell-Fleming, David Hume, Michael Mussa and others proved the effectiveness Monetary Policy in achieving external and internal sector goals, especially GDP growth with price stability, exchange rate stability and equilibrium in the balance of payments. In this context, the present study tries to test the effectiveness of monetary policy on major macroeconomic variables since financial sector reforms. Therefore, the present study attempts to answer the following research questions; To what extent India's GDP responds to the changes in the money supply? Does the change in money supply have any impact on the current account, capital account and overall BOP account? Is there any correlation between the RBIs lending rate with commercial bank's lending rate? How effective the monetary policy is to influence price level, interest rate and exchange rate in India? How effective the monetary policy in solving issues in the domestic economy as well as in the external sector sustainability?

Against the background and research issues, the major objectives of the study is to evaluate the effectiveness of Monetary policy in India with a special focus on the financial sector and banking sector reforms. Also, the study aims to analyse the relevance and effectiveness of monetary policy in India concerning external sector sustainability. Finally, the study will attempt to compare the magnitude of change in the RBIs lending rate with nationalized commercial bank's lending rates for interest rate pass-through in India.

2. Review of Literature

At the time of Great Depression, particularly during 1929 to 33, the central banks were collapsed from control by the Treasuries and became mere pointer damsels in the application of cheap money policies. Cheap money policies were aimed initially at curing the depression which they signally failed to do owing to the expected misperception in central banking spheres of factually low-interest rates with strongly expansionary monetary policy-then at securing low-cost war finance, and then at holding down interest rates for reasons of public debt management and employment maintenance. With the postwar return to increasingly liberal trade and payments system based on convertibility of currencies at fixed exchange rates, however, central banks have rapidly been recovering their influence on economic policy. Their return to power has been based on both the, need to use monetary policy as a major weapon of balance-of-payments adjustment, and on the need for coordination and cooperation to achieve domestic employment without much impact on inflation (Harry Johnson, 1968).

Friedman, M. (1948) raised several questions relating to the effectiveness of monetary policy. Some of them are; how important change in the supply of money compared with changes in the demand for money? Are transactions variables most important in determining the demand for money? How elastic is the demand for money with respect to interest rates? When changes in demand or supply occur that produce discrepancies between the quantity of money that the public holds and the quantity it desires to hold, how rapidly do these discrepancies tend to be eliminated? Does the adjustment impinge mostly on prices or mostly on quantities? Is the adjustment to sharp changes over short periods different in kind or only in degree from the adjustment to slower changes over longer periods? For all the above questions, he concluded that full adjustment

to monetary disturbances takes a very long time and affects many economic magnitudes. If the adjustment were swift, immediate, and mechanical, as some earlier quantity theorists may have believed, or, more likely, as was attributed to them by their critics, the role of money would be clearly and sharply etched even in the imperfect figures that have been available. But, if the adjustment is slow, delayed, and sophisticated, then crude evidence may be misleading, and a more suitable examination of the record may be needed to disentangle what is systematic from what is random and erratic.

Mussa, M. (1974) tested the efficacy of the monetary approach to Balance of Payments analysis. The study set forth the most relevant and important principles of monetary policy and tested the same in a simple model of trade and payment behavior. The study found that the money demand function and the money supply process plays a central role in the balance of payments analysis, especially in the long run. The study concludes stating that the monetary approach is not identified with the view that "only money matters," nor is it asserted that the monetary approach is encompassed in any single, specific, theoretical model.

Frenkel J.A., Gylfason T., Helliwell J.F. (1980) correlated Monetary and Keynesian approaches and found the difficulties of empirical estimation in the short run. They contrasted some principles of the Monetary and Keynesian approach and reformulated a more general model by taking essential features of both. The study observed that long term modeling is required to test the composition and growth of foreign and domestic portfolios. The short term model paid no attention to evaluate the role and expectations concerning interest rate, prices, GDP, taxes, government expenditure and so on. A more complete analysis would have to incorporate these features within modeling that considers the long-run effect.

Frenkel J.A., Mussa M. (1981) examined the role of monetary and fiscal policies in the context of the open economy. The main focus of the study is to trace out the effectiveness and proper conduct of macroeconomic policies in achieving the national objectives. The study uses approaches of James Meade, Robert Mundell and Marcus Fleming's ideologies to test the effectiveness of macroeconomic policies in open economies. They observed no country is immune from disturbances originating in the rest of the world, and no government can sensibly conduct its macro-economic policy on the assumption that it operates in a closed economy. They also observed that they found that the absence of long-run money illusion and consistency of expectations which impose important constraints on the conduct of macro-economic policy in the open economy.

Ray, Partha., Joshi, R., Himanshu., Saggar., Mridul. (1998) explored the monetary transmission mechanism in the liberalisational era in the context of financial sector reforms. The study tried to examine the role of interest rate and exchange rate in the conduct of monetary policy. The long-run relationship between money, prices, output, and the exchange rate is observed. The study found that the Interest rates and exchange rates are seen to be endogenously determined since financial sector reforms and it increases the possibility of the change in transmission mechanism following the advent of financial sector reforms.

Numerous measures were taken to enhance the effectiveness of monetary policy in India under economic reforms and these include improvement in the payment and

settlement systems, improvement of a secondary market in government securities with portfolio diversification in the interest of investor, reduction in non-performing assets and reduction in the overall transactions costs. In recent times, the RBI initiated several steps to develop the money market. Financial sector reforms and banking sector reforms may not have the desired results with commendable fiscal adjustment (Reddy, 1999)

Joshi. (1999) found that the banking sector reforms has been an overemphasis on profits and virtually neglected the distributive role of the banks. They also observed that the strong and high net worth companies within the organised sector are capable of raising funds at a considerably lower rate of interest, while the credit disbursal to small borrowers has sharply declined.

Deepak., Mitra. (1999) observed that the monetary targeting exercise produced mixed results for India. They found that the expansion of money supply emanating from monetisation of government deficit capital flows rendered the control of monetary aggregates difficult. With the increasing market orientation of the financial structure and international capital flows, it is necessary to follow the monetary targeting approach which could ensure internal and external stability.

Kanagasabapathy. (2001) observed monetary policy underpinnings in India over several decades. He also points out the limitations and constraints in pursuing monetary policy objectives and throws light on current mainstream economic thinking and perspective in the context of the changing economic environment worldwide. The study found that the emergence of the interest rate as an efficient variable in the transmission mechanism, the RBI has begun placing greater reliance on Liquidity Adjustment Facility (LAF), especially OMO, Repo, Bank rate, etc., instead of the dependence on CRR alone. Another issue debated in the context of Central Bank autonomy is the separation of debt management and monetary management functions. At the same time, it would require a co-ordinated operation with monetary management to achieve a stable interest rate environment and market condition.

Monetary policy is increasingly focused on Dreze and Sen's view of growth mediated security helps to achieve monetary objectives including price stability and GDP growth will lead to alleviate poverty indirectly. Monetary and financial sector policies in India should perhaps be focusing increasingly on both inflation and GDP growth (Reddy, 2002).

Shankar, A. (2002) witnessed that the practice of monetary policy has clearly undergone a sea change during the nineties but it was more sophisticated later by giving further autonomy to money market institutions. However, several earlier problems and dilemmas were persisted even after the 90s. In particular, the effectiveness of monetary policy continued to be defective due to expansionary fiscal policy as well as an insufficiently responsive financial system.

Nachane., Lakshmi, (2002) observed significant influences of money, monetary policy transmission and on the demand for money. They studied various issues about the instability of the relationship between monetary aggregates and their impact on the macro-economy. The financial change is indeed invoking fundamental alterations along these lines, then they would be manifested in at least certain quantifiable dimensions observed by Nachane and Lakshmi.

Jalan, B. (2002) found that there has been a progressive intensification of financial sector reforms, and the financial sector as a whole is more sensitized than before. At the same time, because of greater disclosure and with tougher prudential norms, the weaknesses in our financial system are more apparent than before. The structure of the financial system is changing and in a fundamental sense regulators and supervisors are under the greatest pressures of change and bear the larger responsibility for the future, observed by Jalan.

Fathima., Iqbal, (2003) tested the effectiveness of monetary policy and fiscal policy for economic growth in five Asian economies which include India, Pakistan, Thailand, Malaysia and Indonesia. The study found unidirectional causality between monetary policy and economic growth in India.

Indranil, B., Partha, R. (2007) assessed the monetary policy stance by observing various monetary policy announcements in India from 1973 to 1998. This study used a Vector Auto-Regressive (VAR) framework and found that the monetary policy seemed to have been more effective in price control than output growth. The impulse response from the VAR model depicted the success of monetary policy in inflation control rather than on GDP reflecting proactive monetary management in a regulated environment. So the study recommended the necessity of future analysis of monetary policy in the pre and post the 90s to trace causal impact on growth-inflation trade-off.

Amaresh, S. (2009) focused RBIs multiple indicator approaches in the conduct of monetary policy since April 1998. Amaresh developed a monetary policy index by synthesising the extracted signals from the policy documents and quantitative information embedded in key indicators. The constructed monetary policy index was used to assess the impact of monetary policy on macroeconomic variables such as interest rates, bank credit, inflation, and output growth during the post-reform period. The study observed that the monetary policy has an instant influence on interest rates, the impact on inflation and output was realised with a lag of around 6 to 18 months.

Hutchison, M. M., Rajeswari, S., Nirvikar, S. (2010) investigated the applicability of the discretionary monetary rule of the Reserve Bank of India concerning Taylor-type rule. The study estimated an exchange-rate-augmented Taylor rule for India for a period of 28 years from 1980 to 2008. The study compares monetary policy effects during the pre- and post-liberalisation periods to capture the potential impact of macroeconomic structural changes on the RBI's monetary policy conduct. The study found that the output gap appears to be important to RBI rather than consumer price inflation and exchange rate changes.

Yogita, K., Jasmit. (2015) examined the factors that are responsible for the inflation rate in India. They also focused on the role of monetary policy in controlling inflation rate. The study used time series data and Granger causality test to check the causal relationship between monetary instruments and inflation. The study found mixed implications from the multivariate linear regression model. Which means, the monetary policy is not the only variable that controls the inflation rate in India

Rakesh, M., Partha, Ray. (2018) provides a narrative of the effectiveness of monetary policy in India since the financial crisis of 2008. They observed that the policymakers used monetary and fiscal stimuli during 2009-13, prompted by the financial

crisis. The study also observed that in recent years, the Monetary policy-making process in India has been dominated by two main events. One is a significant fall in the public sector balance sheet and the other is demonetization effect. The study concluded by stating that the monetary policy in both periods is wrestled with the appropriate strategy for regulating impossible trinity.

Vasudevan (1997 and 1998), provides an illuminating discussion on the dilemma faced in monetary policy-making in a transitional setting. Vasudevan recommended a meaningful analysis that looks beyond the issue of stability of the money demand function in judging an appropriate framework of monetary policy for India.

Several eminent economists tested the effectiveness of monetary policy in the economy with respect to openness of the economy, fixed and flexible exchange rate system and so on. Robert Mundell (1968, 1971), Mc Kinnon (1968), Jacob A Frenkel (1971), Harry G Johnson (1968, 1972, 1977) Swaboda (1973) and Michael Mussa (1974) are the significant approaches that evaluated the effectiveness of monetary policy in the context of internal and external equilibrium. According to Mundell, Johnson and Frenkel, monetary policy is more effective under the conditions of openness and a flexible exchange rate system.

The government of India introduced several liberalisational measures in the banking system under financial sector reforms in 1991 and banking sector reforms in 1998. They also introduced a flexible exchange rate system under LERMS in 1992 (Liberalised Exchange Rate Management System). In this context, the present study tries to estimate the effectiveness of monetary policy and interest rate pass-through in India since major reforms in the money market.

3. Research Methodology

The present study attempts to analyse the effectiveness of monetary policy and interest rate pass-through in India since major reforms in the Indian Money Market. For this purpose, the study uses both descriptive statistics and empirical analysis. First, the study uses Augmented Dickey-Fuller (ADF) test to check whether the data set is stationary or non-stationary. After checking stationarity conditions, the study will apply the Granger causality test for directional relationships. Finally, trend line analysis will be applied to verify causality results and other supportive information. All the estimations and analysis will be done by using E-Views software, 8th version.

The study first applies **ADF test** for each of the variables by using the following sequential testing procedure.

$$\Delta X_t = \alpha + \beta X_{t-1} + \sum_{i=1}^{p} \varphi_i \Delta X_{t-1} + \lambda t + u_t \qquad (5)$$

If $\beta = 0$, meaning that the selected variable X_t contains unit root and the data is not stationary. Therefore, it is highly necessary to include t (deterministic) into the equation. In this analysis, if the trend is stationary and statistically significant, then only the study can perform the econometric technique for analysis.

In the **Granger Causality Test**, the directional relationships between two variables are very sensitive which can be used efficiently by using an appropriate number of lags in the model. It can be inferred from the computed statistical values, based on the given equations, if the beta coefficients become zero or less than the conventional value of 0.05 and the computed F statistic is low for the first hypothesis in the equation (1) indicate that the lagged MS do not possess in the regression (Accepting null hypothesis). This means Money Supply in India does not Granger cause GDP, similarly for other beta coefficients in the first hypothesis of the rest of equations. When we move to the second hypothesis which states that the GDP does not Granger cause Money Supply in India if the computed F statistic is low or P-value is less than the conventional value, we can reject the hypothesis and infer that the GDP does not Granger cause Money Supply in India. Similar results can be derived for other beta coefficients in the second hypothesis of the rest of the equations.

Granger causality test is used to check the effectiveness of monetary policy and interest rate pass-through in India. To check causality between the changes in Money Supply in India with GDP, lending rate, exchange rate and BOP variables, the following model developed by Engel and Granger, (1987) will be used. The models are;

(a) **Money Supply and Gross Domestic Product (GDP) in India**

$$MS_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i}\, MS_{t-i} + \sum_{i=1}^{n} \beta_{2i} GDP_{t-i} + u_{1t}$$

$$GDP_t = \beta_3 + \sum_{i=1}^{n} \beta_{4i}\, GDP_{t-i} + \sum_{i=1}^{n} \beta_{5i} \mathrm{MS} + u_{2t} \qquad (6)$$

(b) **Money Supply and Current Account Deficit in India**

$$MS_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i}\, MS_{t-i} + \sum_{i=1}^{n} \beta_{2i} CAD_{t-i} + u_{1t}$$

$$CAD_t = \beta_3 + \sum_{i=1}^{n} \beta_{4i}\, CAD_{t-i} + \sum_{i=1}^{n} \beta_{5i} MS_{t-i} + u_{2t} \qquad (7)$$

(c) **Money Supply and Capital Outflows from India**

$$MS_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i}\, MS_{t-i} + \sum_{i=1}^{n} \beta_{2i} KO_{t-i} + u_{1t}$$

$$KO_t = \beta_3 + \sum_{i=1}^{n} \beta_{4i}\, KO + \sum_{i=1}^{n} \beta_{5i} MS_{t-i} + u_{2t} \qquad (8)$$

(d) **Money Supply and Exchange Rate in India**

$$MS_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i}\, MS_{t-i} + \sum_{i=1}^{n} \beta_{2i} ER_{t-i} + u_{1t}$$

$$ER_t = \beta_3 + \sum_{i=1}^{n} \beta_{4i}\, ER + \sum_{i=1}^{n} \beta_{5i} MS_{t-i} + u_{2t} \qquad (9)$$

(e) **Money Supply and Commercial Bank Lending Rate in India**

$$MS_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i}\, MS_{t-i} + \sum_{i=1}^{n} \beta_{2i} CBLR_{t-i} + u_{1t}$$

$$CBLR_t = \beta_3 + \sum_{i=1}^{n} \beta_{4i}\ CBLR + \sum_{i=1}^{n} \beta_{5i} MS_{t-i} + u_{2t} \qquad (10)$$

(f) **Money Supply and Inflation rate in India**

$$MS_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i}\, MS_{t-i} + \sum_{i=1}^{n} \beta_{2i} CPI_{t-i} + u_{1t}$$

$$CPI_t = \beta_3 + \sum_{i=1}^{n} \beta_{4i}\ CPI + \sum_{i=1}^{n} \beta_{5i} MS_{t-i} + u_{2t} \qquad (11)$$

(g) **Reserve Bank Lending Rate and Commercial Bank Lending Rate in India**

$$RBLR_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i}\, RBLR_{t-i} + \sum_{i=1}^{n} \beta_{2i} CBLR_{t-i} + u_{1t}$$

$$CBLR_t = \beta_3 + \sum_{i=1}^{n} \beta_{4i}\ CBLR + \sum_{i=1}^{n} \beta_{5i} RBLR_{t-i} + u_{2t} \qquad (12)$$

Where, MS = money supply, CAD = Current Account Deficit, KO = Capital Outflows, ER = Exchange Rate, CBLR = Commercial Bank Lending Rate, RBLR = Reserve Bank Lending Rate, CPI = Consumer Price Index.

4. EMPIRICAL RESULTS

To analyse the effectiveness of monetary policy and interest rate pass-through in India, the study uses both empirical analysis and descriptive statistical techniques. For empirical analysis, the study first uses Augmented Dickey-Fuller and Philips Perron's unit root test for stationarity conditions. After detecting stationary conditions, the study will apply Engel-Granger's Causality test. Finally, the empirical results will be compared and verified with the trend line analysis using growth rates of respective variables used in the empirical model.

The Augmented Dickey-Fuller and Philips-Perron unit root test are conducted for Money Supply, Current Account Deficit, Inflation, Exports, Imports, exchange Rate, Commercial Bank's Prime Lending Rates, Reserve Bank's Lending Rate, Capital Outflows, GDP, Growth Rate of Money Supply, Exchange Rate Growth and GDP Growth. The unit root test is conducted for trend and intercept at a level and first difference.

Table – 1 Unit Root Test

Variables	Augmented Dickey-Fuller Test (Trend & Intercept at first difference)		Phillips-Perron Test (Trend & Intercept at first difference)	
	T Statistic	Prob	T Statistic	Prob
Money Supply	-2.7248	0.2362	-5.0424	0.0023
Current Account Deficit	-4.5345	0.0070	-4.5345	0.0070
Commercial Bank (PLR)	-5.3644	0.0011	-5.3737	0.0011
CPI Inflation	-6.4522	0.0001	-6.4522	0.0001
Exchange Rate	-5.4046	0.0010	-5.4046	0.0010
Exports	-4.4707	0.0081	-4.5158	0.0073
Imports	-3.4691	0.0649	-3.4976	0.0615
Capital Outflows	-0.8012	0.9474	-4.6360	0.0056
RBI Lending rate	-5.2694	0.0015	-7.5906	0.0000
Money Supply growth rate	-6.2469	0.0002	-16.592	0.0000
GDP growth rate	-7.9585	0.0000	-10.404	0.0000
GDP	-2.2924	0.4225	-2.2894	0.4240
Exchange rate growth	-5.8630	0.0004	-15.444	0.0000

Source: Computed

The ADF and PP unit root test results are given in Table – 1. Due to space constraints, the study displays the only trend and intercept values at the first difference in the table. The study observed that the selected variables are non-stationary at a level. But, it is clear from table 1 that almost all the selected macroeconomic variables are stationary at first difference.

The ADF test result shows that the probability value for all the selected variables is less than 0.05 except a few variables like money supply, imports, capital flows and GDP. But the test statistic value for the same variables are less than the critical value at 1 percent and 5 percent leads to the rejection of the null hypothesis and infers that the variables have no unit root. Likewise, the PP unit root test is also observed almost similar results with slight variations. The PP test pointed out a low probability value (less than 0.05 percent) for all the variables except imports and GDP. Hera also the observed test statistic values for imports and GDP are less than the critical value of 1 percent and 5 percent. So we reject the null hypothesis and infer that the variables have no unit root. After fulfilling the stationarity conditions from table 1, the study focuses on the application of Engel-Granger's Causality test for a directional relationship between the selected variables.

The main aim of the study is to test the effectiveness of monetary policy and interest rate pass-through in India. The purpose is to check how effective the RBIs monetary policy in influencing internal and external sector variables. It can be tested using periodical changes in money supply and its effect on GDP, Current Account Deficit, Capital Flows, Exchange Rate, Lending Rate of RBI and Commercial Banks. Usually, these variables have bi-directional and unidirectional relationships. Some variables may not have any associations. For example, an increase in the money supply leads to an increase in demand for goods and price levels. Similarly, an increase in price

level may influence the circulation of money by reducing bond demand is called bidirectional causality. If the increased money supply leads to create only inflation (price level) and no impact in the bond market is called unidirectional causality. For this purpose, the appropriate model is Engel-Granger's Causality test which is applied in this study for analysis.

Table – 2 Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.	Result
GDP does not Granger Cause MS	25	0.60213	0.5573	Unidirectional
MS does not Granger Cause GDP		4.20044	0.0300	Causality
IMP does not Granger Cause MS	25	2.24861	0.1316	Unidirectional
MS does not Granger Cause IMP		10.1886	0.0009	Causality
EXP does not Granger Cause MS	25	1.32295	0.2887	Unidirectional
MS does not Granger Cause EXP		5.08933	0.0163	Causality
CAD does not Granger Cause MS	25	2.88111	0.0795	
MS does not Granger Cause CAD		1.66592	0.2142	No Causality
KOUT does not Granger Cause MS	25	0.08953	0.9147	Unidirectional
MS does not Granger Cause KOUT		4.85208	0.0191	Causality
EXC does not Granger Cause MS	25	0.11754	0.8897	
MS does not Granger Cause EXC		1.82798	0.1866	No Causality
CBPLR does not Granger Cause MS	25	0.57815	0.5700	
MS does not Granger Cause CBPLR		2.70186	0.0915	No Causality
CPI does not Granger Cause MS	25	1.88630	0.1776	
MS does not Granger Cause CPI		0.11976	0.8878	No Causality
RBLR does not Granger Cause CBPLR	25	5.11693	0.0160	Unidirectional
CBPLR does not Granger Cause RBLR		1.93622	0.1703	Causality

Source: Computed

Theoretically, the effectiveness of monetary policy can be tested using two methods. The first method deals the internal sector by assessing the effect of changes in money supply on Demand, Employment and GDP without creating inflation in the economy. The second method deals the external sector by assessing the effect of changes in Money Supply on Exports, Imports, Capital Flows, Current Account Deficit, Exchange Rate and Balance of Payments. These theoretical linkages are converted and given in an equation form in this study. They are the equation (1), (2), (3) and (4) of this study.

Now, the study uses pairwise Granger Causality test results from table 2 to verify the relevance and effectiveness of monetary policy via (1), (2), (3) and (4). Granger Causality test result from table 2 gives unidirectional causality between Money Supply and GDP in India. The probability value of 0.03 rejected the null hypothesis of the money

supply does not Granger cause GDP. This means the test result validated the theoretical relationship given in equation (1) that an increase in money supply leads to an increase in GDP. Figure 1 is also supported that there is a positive relationship between the money supply and GDP in India. It can also be inferred from figure 1 that an increase in money supply increases GDP via aggregate demand without creating an inflation rate in India. It is evidenced from Figure 2 and Granger Causality, both results of no causality between money supply and the Inflation rate in India. Also, the test result reveals the GDP does not influence the money supply. Naturally, the money supply is exogenously determined by the central bank.

Figure – 1 Correlation between the growth rate of money Supply with GDP Growth

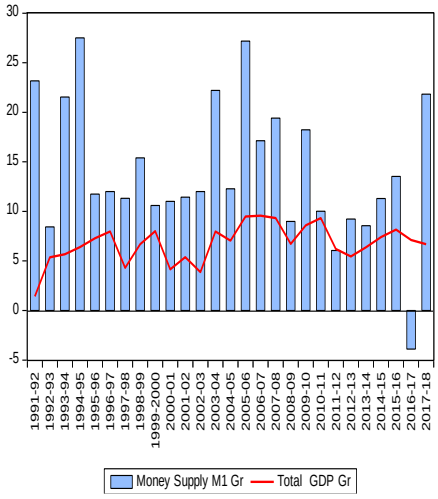


Figure – 2 Correlation between the growth rate of money Supply with Inflation

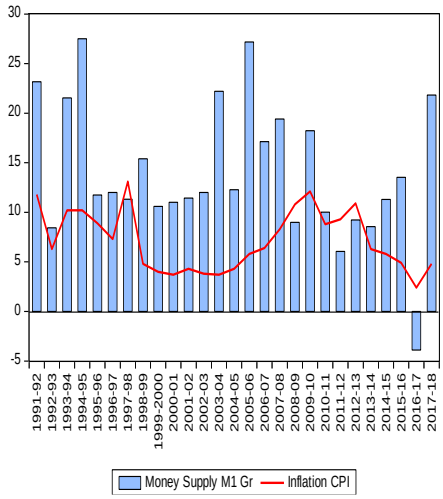


Figure – 3 Correlation between the growth rate of money Supply with Exchange Rate (y-o-y)

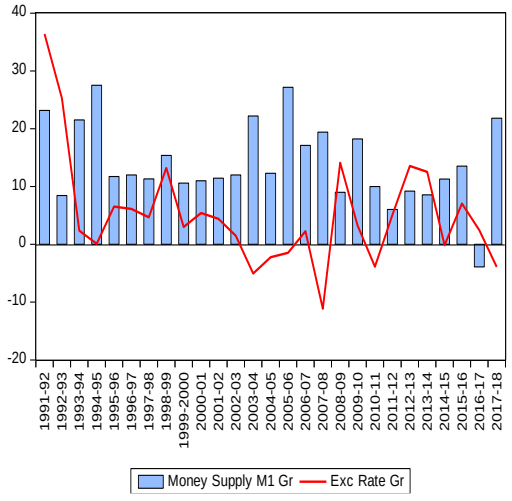
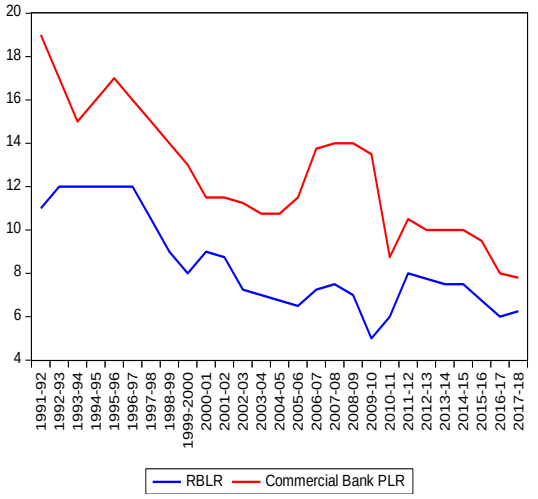


Figure – 4 Correlation between the RBI Lending Rate with Commercial Bank Lending Rate



When we move to the external sector, the study found a very interesting result that validated the effectiveness of the money supply/monetary policy. It is seen from Table 2 that the money supply has unidirectional causality with exports, imports and capital outflows. Theoretically, an increase in money supply leads to increase imports, capital outflows and decrease exports which are given in the study in the form of equation (2) and (3). This study observed Unidirectional causality for the same variables validated equation (2) and (3). But the study did not found any causality between money supply and current account deficit. It means the role of invisible (service trade) plays a crucial role in India's current account than that of merchandise account. Unexpectedly, it is found from Table 2 and figure 2&3 that the change in the money supply does not influences the exchange rate and inflation rate. This is the reason why the money supply has no causality with a current account deficit. As a result of this observation, the restoration process in Balance of Payments is not feasible for India. From these results, it can be inferred that the monetary policy is effective in influencing major variables in the external sector but it is not effective in restoring the disequilibrium in Balance of Payments account.

Now the study focus on the effectiveness of interest rate pass-through in India, especially since financial sector reforms. For this purpose, the study uses money supply, Reserve Bank's Lending Rate (RBLR) and Commercial Bank's Prime Lending Rates (CBPLR). First, the study tested the relationship between CBPLR and money supply. Usually, the money supply is determined exogenously by the central of the country and not by CBPLR. The Granger causality test result gives 57 percent p-value for CBPLR and money supply proved that the money supply is exogenously determined by the RBI and not by CBPLR. When the study tries to estimate another directional relationship between money supply and CBPLR, the study detected a 10 percent level of significance. This means, CBPLR not only depends on RBPLR, also it responds to changes in the money supply at a 10 percent level of significance. i.e.., demand and supply of money also determine CBPLR instead only RBLR. Secondly, the Granger causality test result gives unidirectional causality between RBLR and CBPLR. It means any change in RBLR will cause changes in CBPLR. It is also evidenced in figure 4 that the RBLR and CBPLR move almost in the same direction in the entire study period. From 1991 to 2011, the gap between CBPLR and RBLR was high, but in recent years, the gap is also reducing and moving towards the same direction proved the effectiveness of interest rate pass-through in India.

Conclusion

Financial sector reforms in 1991 and Banking sector reforms in 1998 gave adequate autonomy to the commercial banks and other money market institutions for liberty in decision makings. Due to this, the commercial banks did not properly respond to the rate cut of RBI on several occasions. As a result, the question arises whether the monetary policy and interest rate pass-through is effective in India or not. Especially, since financial sector reforms and Banking sector reforms. For this purpose, the study tries to test the effectiveness of monetary policy and interest rate pass-through in India in the liberalisational era. The study found mixed implications for monetary policy effectiveness

and interest rate pass-through in India. First, the study observed that the expansionary monetary policy influences GDP positively without creating inflation in India. It is evidenced in figure 1 that the GDP growth rate is associated with the growth rate of money supply and inflation is not responding to the money supply in figure 2. From this observation, the study infers that the monetary policy is an effective tool to achieve internal equilibrium in India. Secondly, the expansionary monetary policy has unidirectional causality with imports, exports and capital outflows proved the effectiveness of monetary policy in the external sector too. But the study observed that the money supply has no causality with the current account deficit and the exchange rate lacks the significance of monetary policy in the context of an automatic restoration process. Thirdly, the study observed an interesting result for interest rate pass-through. The Granger causality test result provides unidirectional causality between Reserve Bank's Lending Rate and Commercial Bank Lending Rate. This means, even though adequate autonomy was given to commercial banks, their lending rates are directly correlated to Reserve Bank's lending rate proved that there is a strong interest rate pass-through takes place in the organized money market in India. Finally, the study concludes by inferring that the monetary policy is effective in India in terms of achieving internal equilibrium via a strong interest rate pass-through. It also effectively influences exports, imports and capital flows but fails in the process of automatic restoration in the external sector. So, the study suggested that the Reserve Bank of India should strictly follow Friedman's monetary rule instead of discretionary monetary policy induced by the ministry of finance.

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STRATEGIC DIRECTIONS OF STRENGTHENING SUSTAINABLE FOOD SYSTEMS IN HEALTH CRISIS: CASE STUDY OF TUNISIAN NON-GOVERNMENTAL ORGANIZATIONS

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Abstract

Purpose: The objective is to identify the procedure put in place by Tunisian non-governmental organizations (NGO) to strengthen the sustainable food system in health crisis. Indeed, we will study the impact of the strengthening of the food supply chains on international trade. We will start with a presentation of the cause for which the NGO has strengthened its food system. Next, we will study the repercussions of improving the system on the various plans within the lean department while analyzing the results obtained. In a final part we will give recommendations to further improve the quality of the product provided by the engineers.

Design / Methodology / Approach: The Value Stream Mapping (VSM) approach presented in this case study, which allows a NGO to identify its strengths and weaknesses as well as potential for improvement, is derived from COVID-19 experience with NGO in Tunisia. The improvements are made by the Kaizen approach. All the results are discussed from a theoretical, methodological and practical point of view.

Findings: Lean management is a source of improvement in the performance of any NGO, which improves its processes, rationalizes risks and avoids large losses in the period of COVID-19. In summary, sustainable food system is not only a competitive advantage but a strategic necessity in Tunisia.

Research limitations: The results cannot be generalized beyond the study population and similar context in such health crisis.

Practical implications: The study provides operational guidance on how best to reorganize the NGO in Tunisia. Thanks to the reorganizations carried out, we note that all the indicators evolved positively throughout the COVID-19 period.

Originality / Value: The originally found in this case study heaviness in the implementation of the new processes. This study produces new knowledge based on observations, experiments and new approaches to solve problems related to the health crisis.

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JEL Classification: M20, M14, M48, Q56.

Introduction

Since the beginning of the year 2020, the health crisis has caused indescribable disruption in supply chains management around the world (Choi et al. 2020). WHO (2020) argues that it is not easy to strengthen the sustainable food system in the event of a health crisis. Likewise, the crisis reveals deep interconnections between supply chain management in the event of an unforeseen pandemic. Negative results include, among many others, the difficulty of increasing food production capacity and handling conditions in the period of total containment, the rapid response to COVID-19, food hoarding triggering bullwhip effects, as well as the fragility of supply chains contributing to the global economic chaos it faces in the world (Ivanov and Dolgui, 2020). As a result, Tunisian non-governmental organizations (NGO) are facing several problems related to the health crisis. These crises are causing material disruption to the way that charities raise revenue and carry out their activities (Keating and al, 2017). This poses both challenges and opportunities for partners, funders, charities and regulators.

However, pricing requires the NGO to take into account internal factors related to exorbitant handling costs during the total containment period and external factors such as partner attitudes in this period of COVID-19, existence of hygiene regulations and sound structure of the market in which the Tunisian NGO has operated. Similarly, when setting the selling price, the Tunisian NGO must first take into account internal factors linked to its costs: production costs fall into two categories, fixed costs and variable costs, which depend on quantities produced. The NGO cannot consider selling below what it costs the product. It therefore calculates the unit cost of production to which it adds the unit cost of distribution and handling, allowing it to know the unit cost of production of the product. The Tunisian NGO adds its margin and thus determines its selling price. The margin is used to remunerate lenders and to finance the activity of the NGO (Rahayu and al, 2020).

Production costs are linked to the quantities produced: large-scale production reduces the unit cost of production, which is a major advantage for companies with mass production markets. This shows that Tunisian NGO with limited market segments need to redouble their efforts to secure their activity (Yasin and al, 2020). As a result, and faced with high and low market prices for raw materials and increasing personnel costs during the total containment period during the COVID-19, the Tunisian NGO must seek to optimize its production time given the total containment period in order to reduce costs and eliminate waste, which the partner only pays for added value (Thunsrom and al, 2019). Thus, and based on this lean management approach, we have decided to create a project that addresses the problem of waste in Tunisian NGO, and with the objectives of reducing production costs and improving performance indicators in order to strengthen the sustainability of food system in health crisis.

The Value Stream Mapping (VSM) approach presented in this case study, which allows a NGO to identify its strengths and weaknesses as well as potential for

improvement, is derived from COVID-19 experience with NGO in Tunisia. At the beginning of the activities, the entire characterization process could take up to four months to collect and analyze the data. This was done on all the products of a NGO participating in the project. The number of interviews was limited to 30 engineers because of the length of the process (Julien and al., 2003). As a result, a three-day intervention approach based on the analysis of a targeted product family through Pareto analysis has been developed and now responds to the term value chain mapping. This approach identifies opportunities for improvement from the results of the process mapping and the overall rate of return estimation based on availability, efficiency and quality indicators.

This paper presents the implementation of the Value Stream Mapping (VSM) project in Tunisian NGO. It is structured as follows:

- Determination of the family of products,
- Drawing of the current state,
- Drawing of the future state,
- Action Plan and Implementation.

The originally found in this case study heaviness in the implementation of the new processes. As a result, 30 engineers have decided to identify sources of waste in individual value chains, that is, for a product or a product family.

The VSM project is based on the continuous improvement of responses from the following guiding questions:

Q1: Do I know what to do?
Q2: Do I avoid waste?
Q3: Am I meeting the deadlines?
Q4: Are we better today than yesterday?

Literature review

The origin of the lean management dates back to the 1950s, when Ohno launched the design of the Toyota Production System (TPS), a Toyota engineer. In the 80 launched the "International Motor Vehicle Program" (IMVP), the "Massachusetts Institute of Technology" (MIT), leading to a comparative study of school performance based on their modes of organization (Womack, Jones and Roos, 1990). It is during this research that the concept of "lean manufacturing" appears, thus following others based on the same bases, which are just-in-time or Japanese-style management. However, Langstrand and al. (2009) shows that the characteristics of lean are different depending on the engineers who approach and the companies in which it operates. There are a variety of NGO that have experienced the advantages of applying Lean in their manufacturing area. For instance, Lean management was applied by Boeing to eliminate waste and make its products more cost-competitive. After implementing Lean management, Boeing successfully cuts its defect costs by 75 percent, which resulted in a cost savings of about $655,000 per aircraft (Jones, 2013).

Moreover, after applying lean management in its manufacturing system the inventory level of DELL dropped by 50% and the time required to produce a PC was reduced (Poppendieck and al., 2003).

These companies are major producers of tangible products and the result of their improvements can be measured by comparing the product cost before and after implementation of the lean management. In order to obtain such benefits in the office settings of the manufacturing, Lean principles are now being applied in NGO to improve their performance and to be competitiveness. Indeed, the price differences between competing products can be such that it becomes difficult to compensate them by differences in value added.

Value stream mapping (VSM) has emerged as a method for researchers and practitioners to identify sources of waste in individual value chains while directing actions to eliminate them or at least reduce their scopes. (Hines and Rich., 1997). However, for many companies the main interest of implementing a Lean methodology remains an approach essentially directed towards the improvement of production methods. The theory developed by Goldratt in the early 1990s aims to increase production capacity and establish benchmarks for effects on total production costs. Together, these three approaches turn into cost-saving attempts by eliminating waste in the production system. To be truly effective, the search for a competitive advantage must also be based on a more integrated approach to the Lean method (Hines et al., 2004). Thus, VSM's strategic approach combines the application of production improvement tools, such as Kanban, and quality control, with the need to meet partner needs (Bekkers and al, 2021). Providing more flexibility, but also acting directly on capacity constraints. Studies in the field have also been conducted by researchers, including Serrano et al. (2006) which highlights the properties and benefits of using the VSM approach as a functional technique aimed at redeveloping the production system from a Lean management, through the analysis of the process, is carried out in two stages. The first step identifies the value-added activities for which the partner is willing to pay and the second step represents the unnecessary activities primarily related to inefficiencies in the process such as foreclosures, material handling, machine outages and overproduction.

The breakdown of these activities into a sequence of elementary operations allows the NGO to better evaluate its sources of competitive advantage. (Porter 1998, San Miguel 1996, and Tapping and al. 2002).

The value stream is defined by a NGO's internal processes or activities to design, manufacture, market, deliver and service. The value stream can be studied from the concept until the start of production or the order until receipt.

Value is defined as the service or product delivered to the partner at the right price, at the right time and as defined by the partner. There are two types of values; value added and non-value added.

Value-added refers to any activity that adds value to the product, that is, the activities for which the partner is willing to pay (Thunsrom, 2020).

Non-value added represents unnecessary activities that do not add market or functional value to the product, that is, waste. Thus, the value stream breaks down business activity into a sequence of basic operations and identifies sources of potential competitive advantages. It shows the activities (main and support) required for the proper functioning of a business. It should be noted that support activities should not be removed but they can be reviewed to ensure their optimal and effective integration.

Methodology

The main concepts used by the methodology described later highlight a family of products. According to Julien and al. (2003), a product family is a grouping of products that share similar processes and / or equipment. Indeed, the methodology used is based on the following steps:

- Follow the path of manufacturing a product from the partner to the supplier.
- Visually and accurately, represent each process throughout the flow of material and information.
- Ask the key questions and draw the new value chain

This section briefly presents industrial engineering tools commonly used in the value chain mapping process.

Flowchart

A flow chart presents a series of manipulation made on a product according to a series of standardized symbols. The table below shows the six symbols used to represent an operation, delay, inspection, transportation and storage.

From these symbols, a complete process can be represented either by an assembly diagram or a process diagram. This step is important because it allows to visualize the flow of the product and incidentally the sources of waste in the chain.

Matrix From-To

This matrix is used to evaluate a development taking into account the distance between departments or machines and the intensity of exchange between them. The multiplication of the distance by the intensity makes it possible to obtain a score for the development. This tool highlights transportation issues in a development.

Seven statistical tools of quality

The 7 statistical tools of quality are Pareto analysis, cause-effect diagram, diagrams and graphs, the analysis sheet, the histogram or the sheet diagram, the scatter plot and the control charts. The usefulness of these tools is to make it possible to analyze a problematic situation or process in order to take action to better control or improve it.

The Pareto analysis, commonly used, is very useful because it allows to define the priorities of action. There are several variants of Pareto, in terms of cost, frequency, ... In general, the finding of the analysis is that around 80% of problems are related to 20% of causes.

Costs of quality

For many years, there has been little effort to measure the costs of the quality function. Several organizations began in the 1950s to formally assess quality costs. One of these pioneers, Juran, estimated more than 30% of the cost of quality in business. Quality costs include prevention costs, evaluation costs, internal failure costs and external failure costs.

It is not uncommon for an NGO not to know the true costs of quality. Indeed, during several mappings, the entrepreneurs know at most the percentage of return of partners and sometimes the rejection rate to different operations. It is very common that the cost of rework is not calculated.

Results

The objective of this section is to present the results of this study and establish findings by different NGO in Tunisia.

Determination of the product family

For this case, the study will focus on a family of products that undergo the same treatments.

The ABC method (Pareto, 1896)

It proposes to distinguish three classes A, B and C, which are distributed as follows:
- Class A: elements representing 80% of observed effect.
- Class B: items representing the following 15%.
- Class C: the elements representing the remaining 5%.

In the case of researching the family of products to be studied, the observed effect will be "sales" and the items will be "Products of the enterprise". Once the classification is established, the choice will be made among the products of Class A. If there are too many products in the A-Class, then a second selection may become necessary. To do this, it is advisable to draw up a table as Table 1, summarizing which equipment is used for the different products of class A. This amounts to creating a matrix products / equipments Composed of "0" and "1".

This type of matrix sometimes reveals obviously the product families. This is not the case for Table 1. It will be able to be reorganized thanks to a mathematical tool: the Analysis in Principal Components in order to group the close products in terms of use of equipment.

Table 1: Example of product / equipment matrix for grouping products into families

		Product							
		A	B	C	D	E	F	G	H
Equipment	1	**1**	0	**1**	0	0	**1**	0	**1**
	2	**1**	0	0	0	0	**1**	0	0
	3	0	**1**	0	0	0	0	0	**1**
	4	**1**	0	**1**	0	0	**1**	0	0
	5	0	0	0	**1**	0	0	**1**	0
	6	0	**1**	0	0	**1**	0	0	**1**
	7	0	0	0	0	**1**	0	0	**1**
	8	**1**	0	**1**	0	0	**1**	0	0
	9	0	0	0	**1**	0	0	**1**	0
	10	0	**1**	0	0	0	0	**1**	0

Principal Component Analysis (PCA)

This method is based on the calculation of the correlation coefficients between the series of values of two variables in order to determine whether they are dependent on each other. To do this, it is necessary to calculate the variance of each series (the value that characterizes the dispersion of a distribution) and the covariance between the two series (a value that characterizes the dispersion of one distribution over another).

The correlation coefficient r is a value between -1 and 1 which reflects the degree of linearity between two sets of data that is to what extent two variables "vary together". The closer the coefficient is to the extreme values -1 and 1, the stronger the correlation between the variables. A correlation equal to 0 means that the variables are linearly independent.

In the context of family product formation, this is tantamount to saying that:

- "r approaches 1", the more products use the same equipment (positive correlation).
- "r is close to 0''; there is no link between products in terms of equipment use.
- "r is close to -1", less equipment useful to one of the products, is the same for the other (negative correlation).

We will therefore only distinguish the coefficients close to 1, which lead to the conclusion that the products belong to the same family, and those not close to 1, which correspond to different family products (Husson & al., 2009).

Application of the PCA for the determination of product families

Using Table 1, it becomes possible to calculate the correlation coefficient between products and place them in Table 2.

A	A11	B	C	D	E	F	G	H
A	1							
B	-0.53452	1						
C	0.801784	-0.42857	1					
D	-0.40825	-0.32733	-0.32733	1				
E	-0.40825	0.218218	-0.32733	-0.25	1			
F	1	-0.53452	0.801784	-0.40825	-0.40825	1		
G	-0.53452	0.047619	-0.42857	0.763763	-0.32733	-0.53452	1	
H	-0.25	0.356348	-0.08909	-0.40825	0.612372	-0.25	-0.53452	1

Table 2: Product Correlation Coefficients

For greater understanding and as an example, here is how the value entered in the turquoise blue box of Table 2, corresponding to the correlation coefficient between Products D and G, was obtained.

First, calculate the variances and covariance for products D and G, the values of which are given in Table 3:

		Product	
		D	G
Equipment	1	0	0
	2	0	0
	3	0	0
	4	0	0
	5	**1**	**1**
	6	0	0
	7	0	0
	8	0	0
	9	**1**	**1**
	10	0	**1**
Variance		**0.16**	**0.21**
Covariance		**0.14**	

Table 3: Calculation of variances and covariance for products D and G

The calculation of the correlation coefficient follows:

$$r_{dg} = \frac{S_{dg}}{\sqrt{S_{dd}} \times \sqrt{S_{gg}}} = \frac{0.14}{\sqrt{0.16} \times \sqrt{0.21}} = \mathbf{0.763763}$$

The color code in Table 2 (green, violet, turquoise blue) corresponds to the families identified. After grouping the products of the same color in Table 4 (obtained by changing the order of rows and columns in Table 1), it becomes more evident that they are part of the same family.

Three families of products have been identified with this method:
- Family 1: A, F and C
- Family 2: H, E and B
- Family 3: G and D

This is only a categorization by way of indication, the final choice of the product family to be studied is made by the project team and may be different from the result of the CPA.

		Product							
		A	F	C	H	E	B	G	D
Equipment	2	1	1	0	0	0	0	0	0
	4	1	1	1	0	0	0	0	0
	8	1	1	1	0	0	0	0	0
	1	1	1	1	1	0	0	0	0
	7	0	0	0	1	1	0	0	0
	6	0	0	0	1	1	1	0	0
	3	0	0	0	1	0	1	0	0
	10	0	0	0	0	0	1	1	0
	5	0	0	0	0	0	0	1	1
	9	0	0	0	0	0	0	1	1

Table 4: Reorganization of the product / equipment matrix in Table 1

Drawing of the current state

In order to develop a reworked map of the value chain of a product or a family of products, one must first know the current situation. This part is devoted to the drawing of the VSM card in its current version.

First Phase of Design

The VSM is part of a chain-of-value improvement approach. This implies a clear definition of the value of the product (s), in the eyes of the partner (Kumar & al., 2016).

Second phase of the drawing: Manufacturing Processes

Then, the two icons used in the VSM are the manufacturing processes, also called Case Processes, and Stocks. Process boxes represent operations where the raw material is processed. In order to limit their number on the drawing, the connected steps or the workstations belonging to a single process are represented by a single icon. On the other hand, if an operation is cut off from the next (geographically or temporally) and intermediate stocks accumulate between the two or are moved in batches, then two process boxes are needed. This differentiation also depends on the purpose of the study, if the objective is to understand in detail an operation, then it will be necessary to use a process box for each of its steps. Placed end to end, the process boxes constitute the material flow, which is placed in the lower half of the design of the VSM, from left to right in the direction of the treatment of the materials and not according to the physical layout of the places. Between each process box is a stock icon, below which are entered the number of items found there and their type. There is also one at the beginning of the chain: it schematizes the materials coming directly from the supplier. The NGO presents a flow of linear material, but this is not always the case. Some value chains are made up of several streams that come together later.

Below each process box is a data box that summarizes important information about the process represented. Here are some examples of information that may be listed:

- The cycle time (TC)
- Value added time (VAT)
- The turnaround time (DE)
- The time of change of manufacture
- The number CPC (each piece each [hour, day, week ...])
- The number of different products
- Voluntary working time available (Chapman and al, 2020)
- Usable time
- The rate of scrapping

Third phase of the drawing

After focusing on the partner and then on the manufacturing process, the third step concerns suppliers. The representation of the frequency and mode of delivery is the intermediary between the supplier (s) and the first step of the process, as well as between the last step and the partner(s). A wide arrow indicates a delivery between two factories, and a truck (or an aircraft, a boat ...) which mode of delivery is used.

Fourth Drawing Phase: Information Flows

At this stage of construction of the VSM card, only material flows have been drawn. The fourth phase aims to represent information flows. To do this, we need to introduce new icons essential to the understanding of the drawing: a straight line represents a flow of physical information (on paper in general), while the lightning corresponds to an electronic information flow. A frame placed in the middle of an information flow is used to describe this flow (giving an exchange frequency for example). There is another type of connection that it is important to characterize: the movement of materials between the manufacturing processes. Two configurations are possible to organize production: either the products are pushed by the supplier process or they are driven by the partner process. The pulsed flow system is based on forecast downstream process requirements. By definition, these forecasts do not correspond to reality and therefore the production of each process is never perfectly in line with those of others. Each behaves like an "isolated islet" which tries to manage its timing and its production rate individually. In this type of organization, intermediate stocks appear. They allow the upstream process to continue functioning even if its products have not yet been used by the downstream process. That's why this system is called pushed flow: each process produces at its own pace and when it is finished, it pushes the parts to the next process. The flow-based organization is quite different: it is the downstream process that asks the upstream process to produce. The quantity of voluntary work in progress is thus reduced, and the reactivity of the macro-production process increased (Chapman and al, 2020).

Timeline

The diagram obtained is divided into two parts: the upper part is devoted to the information flow, while the lower part contains the data relating to the flow of materials. This is a representation of the operations of the manufacturing process more visual and easy to understand than the plant layout of the plant. There is, however, one final step in the

mapping of the value chain: the representation of the time line. This line is drawn under the production process boxes and the stock icons (lower part of the drawing) and is intended to calculate the Lead Time. Below each case processes are copied the corresponding turnaround times. For stock icons, the times used are those passed by each of the items in these stocks. Delays are expressed in days and are calculated by dividing the quantity of parts stored by the number of products required daily by the end partner. The addition of turnaround times and storage times gives a fairly accurate estimate of the Lead Time (in most cases, the time spent by a part in the manufacturing process is negligible compared to the storage period). The sum of the processing times for the manufacturing process corresponds to the processing time applied to each of the parts. Under such conditions, the processing time corresponds to the green time (value added time), while the red time (non-value added time) is equal to the difference between the Lead Time and the processing time. For strings composed of multiple parallel streams, the longest path will be used to determine the global time (Lead Time and processing time).

VSM

The mapping of the current state is now complete. This exercise has aroused a number of questions and observations concerning the areas of overproduction. The work carried out until now will have been in vain if the map of the current state is not analyzed and reworked, in order to construct the drawing of the future state.

The third part of the VSM approach is a transition stage: its purpose is to analyze the current state in order to reflect on the future state. To do this, a new mode of operation of the production of products called production at the right (Benson, & al., 2016).

The NGO works with 2 teams that each work 8 hours a day (with 30 minutes of break). The partner request is 600 rings per day. The Takt Time of the production activity is 90 seconds. This is tantamount to saying that if the NGO wants to respond to partner demand, hardware must exit its production line every 90 seconds.

This implies that the cycle times of each manufacturing process correspond to the Takt Time, or at least do not exceed it. This adaptation of production requires:

- an effective response to problems leading to systematic delays.
- the elimination of causes of unexpected stoppages.
- redefining the manufacturing steps.

In the drawing of the future state, if a continuous flow is established between two processes, then their execution times will accumulate and the two process boxes will merge to form only one. But be careful, in accordance with Foundation # 1, the overall cycle time must be less than the Takt Time (Shepherd and al, 2019). The entire value chain must not necessarily be in continuous flow. When situations such as those described above arise, there are two alternatives: flow drawn with storage depots or the FIFO corridor (Bernier and al., 2007). By definition, if a continuous flow is unthinkable, this implies that two discontinuous streams are kept at some point in the value chain. The link between these two processes can be managed through storage depots. In order to avoid recreating a situation of overproduction and product accumulation in stocks, it is

preferable to control the process downstream rather than attempting to schedule production with estimates of partner needs.

The introduction of a Kanban system is then necessary. Kanban is a flow management mode created by Toyota that is based on labels (Mitchell, & al., 2014). The principle is very simple: Process removes what it needs from the storage repository at the time it needs it, and then the procurement process starts production of items that have just been removed from the repository to replace them. The labels are the vector of information ensuring the organization of the production. They are placed on each of the elements that have just been produced. When the partner takes one of these items from the warehouse it removes the label from it and stores it in a summary table. The supplier regularly consults this table and knows what has been consumed and what he must produce again, the labels then become production orders. Geographically, the storage depot is preferentially located next to the procurement process. This situation accentuates the view that the downstream process is a partner who comes to withdraw its products from the depot, and in doing so, triggers production at the supplier. Continuous flow and pulled flow are perfectly complementary in production management. By interposing the two it becomes possible to control the flow through the Kanban labels and to limit the storage areas and the number of work in progress. The manufacturing process thus gains in reactivity and speed, and programming based on estimates becomes unnecessary. The FIFO corridor (First In, First Out). The drawn stream is a good alternative to continuous flow when it is impossible, but it cannot be applied effectively in all cases. For example, it is difficult to have a storage depot that contains all the elements of the procurement process when the number of versions is large, or where the size of the parts is large. The same applies if the parts are made to measure (therefore unique), costly or have a limited shelf life. The FIFO corridor is a solution adapted to the scenarios described above. It is established between two discontinuous processes to make the connection. Its principle is simple: when a part leaves the upstream process, it enters the FIFO corridor and places itself at the top of the line. If the maximum capacity of the FIFO corridor is 1, then production is described as One Piece Flow operation. This is a good alternative when continuous flow is impossible because there is only one part between two discontinuous manufacturing processes: when the product leaves the upstream process it is transported to the downstream process which, as soon as It is available, will treat it. There is an unavoidable rule in the designation of the programming point represented by the regulating process: there can be no storage and / or flow zone drawn downstream of the regulating process. This is why the choice is often based on the process just after the last stock in the value chain. Case A applies to a production entirely based on drawn streams, the last manufacturing process therefore constitutes the programming point. For Case B, the regulatory process is mostly in the upstream part of the value chain, as is often the case for custom manufacturing. The more upstream the regulating process is, the more the reactivity of the production chain decreases. This is the main disadvantage with the use of FIFO corridors. It is up to the program to schedule the production, that is to say to fix a rhythm of manufacture, rather than to issue a list of batches to be produced during the day or in the week without worrying when it will be done . This action is all the easier because the regulating process constitutes the only trigger zone for production. The

manufacturing launch pace chosen is the unit of time in which the chain will operate, it is called no production. A production order will be issued at each production step. For example, it can be defined as the cycle time of the regulating process, or the time required to produce a packaging unit with which the partner wishes to be delivered (unit, carton, pallet, etc.). This smoothing of volumes helps to avoid passing on the vagaries of demand on production. The pace of work is preserved, the efficiency of the chain is increased and the workflow is predictable. Smoothing of the type of products requested. It is more convenient to produce many parts of the same type as a result, then reconfigure the hardware and start a new series of parts different from the previous ones. However, this encourages the creation of stocks which, because of the whiplash effect, are all the more important when the storage area is located upstream in the production line. Lean Manufacturing thinks rather to produce regularly and in small quantities each type of products. This reduction in batch sizes reduces inventory and gives the NGO greater flexibility and responsiveness. The major disadvantage of this type of organization is an increase in the number of changes of manufacture, but it can become negligible if efforts are made to reduce the time required to reconfigure equipment. In our case, the daily partner demand is 30 pieces and it takes 30 minutes to produce one, then the production time will be 15 hours per day. Let's say that the opening time is 16 hours a day, this leaves 1 hour of "free". If the unit time for a manufacturing change is 20 minutes, then it will be possible to make 3 changes per day, thus producing 3 batches of different parts. The fourth and last part is devoted to the redesign of the VSM card. This phase of representing the future state of the value chain enters the Improve stage of the DMAIC process (Zhen He, & al., 2014). The objective of Lean Manufacturing is to identify and eliminate sources of non-value added. Some waste is linked to the technology used, the plant layout in the plant, or the design of the products. These themes are not explored in the drawing of the future state, but they can be studied further by other methods than the VSM.

Study limitations

In the context of health crisis, considering that one of the phases consists of a systematic procedure, carried out through lean management, the sources are limited to the consultation bases selected by the researcher, which may interfere in the quality of data and case studied during the main phases. It is also worth noting the difficulty in generalizing the empirical findings, since COVID-19 period had as a source of data the development of a 30 engineers' behaviors. Even if composed of specialists in the area under discussion, the findings may not represent common sense.

Conclusion

The study provides operational guidance on how best to reorganize the NGO in Tunisia. Thanks to the reorganizations carried out, we note that all the indicators evolved positively throughout the COVID-19 period.

Lead Time increased from 65.3 days to 12.2 days. The difference between the two comes from stocks that have been reduced or eliminated. The ratio of processing time on Lead Time was 1.5%, it was multiplied by more than five and is now 8.2%.

It is important to note that the processing time (green time) has not been modified, the reshuffle that has been carried out has only concerned the stocks, that is to say the wastes (red time).

Further improvements can be made to this new functioning. For example, stocks of raw materials could be managed by Kanbans, and thus be reduced again. A study could also be carried out on the 40% of the production time used for other products, in order to determine whether a continuous flow can be established between these two processes.

The strengthening of its sustainable food system positively affects the performance of the NGO and therefore hung the price of "the best Tunisian NGO" in the field of international trade for two years.

It was likely that the NGO's partners were afraid of this health crisis, but all the engineers: lean department and other departments did everything they could to allay the concern of their partners.

The food security policy represents a label of sector development in Tunisia which separates the NGO from its competitors, and which is exploited by the NGO's partners with their foreign associates. Consequently, the volume of transactions processed has increased.

In conclusion, lean management is a source of improvement in the performance of any NGO, which improves its processes, rationalizes risks and avoids large losses in the period of COVID-19. In summary, sustainable food system is not only a competitive advantage but a strategic necessity in Tunisia.

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NEW ECONOMIC RETHINKING RELATED WITH SUSTAINABILITY TRANSFORMATIONS NOWADAYS

Gheorghe-Cosmin Manea[*]

Abstract

Nowadays the supposed world transformations also include economical paradigms in our Sustainable Development Agenda. In the context of periods of economic collapse within the society due to various factors, this phenomenon has been exacerbated by problems arising due to climate change, leading to a difficult situation regarding both economic development and the application of good sustainable development practices. An opportunity for economic unlocking and, at the same time, for maintaining the imposed environmental regulations was identified in the development of a paradigm regarding the "creative economy", considering that it can play a key role in decongesting the problems that have appeared in both interdependent areas.

During the development of this study, we considered the suggestion of some facilities to encourage the research-development-innovation activity within the Government Institutes, universities and profile big companies, as they also benefit from the advantage of being able to self-finance their activity and, therefore, they need an assurance and an incentive, so that the efforts are justified and the investments made produce income in the future, resulting in valuable concepts that can be applied. As a facilitator of the development of this paradigm that can go from the conceptual to the practical one with measures that can be taken at the level of the governmental policies, by thinking of fiscal facilities for investments in the creative fields, such as: the exemption from the payment of the tax on the profit (re) invested in creative activities for any type of public or private institution; exemption from paying corporate income tax for creative and/or newly established businesses for a certain period of time. Thus, the role of research in the economic field could be reoriented creating a link between the basic principles and rethought in order to get reconciliation between economy and environment. During the study, a report with case studies is presented aiming to find another approach that will support economic progress not in the detriment but in favor of the environment.

Keywords: sustainability, economy, development, research, environment, innovation, investment

JEL Classification: P48.

Introduction

The environment is an economic factor of the greatest importance, traditionally considered by economic analysts as a factor of production, along with capital and labor. Human society, at the end of the millennium, can be characterized as a world of diversity and contrasts.

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Of course, from the point of view of environmental protection, environmental dysfunctions or crises are important. Often the economic and social activities of people, as well as the components of the environment can be disturbed by the tragic effects of some natural phenomena (calamities) or anthropogenic actions out of control that can produce destructive and brutal disorders of a system [2].

The World Health Organization defines a disaster as any event that causes damage, ecological destruction, life loses, and deterioration of health and health services, on a scale strong enough to warrant an extraordinary response or intervention outside the affected community.

Another aspect that humanity is facing is the fact that it has become increasingly dependent on the artificial environment, both through biological and social mutations that emphasize the importance of the environment in ensuring efficient transfers of resources to the artificial environment. The environmental economy therefore aims to assess the capacity of the natural system to participate in transfers to the artificial system both in stationary mode (short-term) and in dynamic mode (long-term) [1].

Thus, with the development of human activity the geographical and generational borders acquire new contours. The problem that arises concerns how actors, for example states, need to become aware of possible risks, given that most, if not all of these global environmental dilemmas can have different effects on different countries: while some countries could be completely inundated by rising global ocean levels, predicted by some climate change patterns, and arid countries may witness complete desertification of their agricultural lands, others may experience increased agricultural production in climates more warm than the traditionally extreme regions which offer the possibility of longer periods for plant growth.

In addition, countries that unilaterally take measures to reduce environmental hazards may face the risk of self-generating the vulnerability of their economies to compete with countries that do not take such measures.

Environmental responsibility from an economic perspective

The environment is an economic factor of the greatest importance, traditionally considered by economic analysis as a factor of production, along with capital and labor. Human society, at the end of the millennium, can be characterized as a world of diversity and contrasts [3].

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Environmental responsibility from an economic perspective

The essence of the sustainable development of the human society is given by the management, current and future, of its natural, energy, material, human and information resources, in relation to the objectives of economic growth and ensuring a better quality of life and environment.

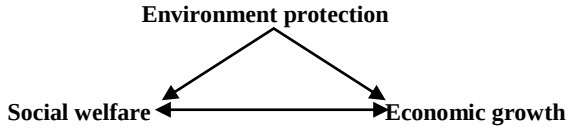
The concept was initially linked to the environmental issues and the crisis of natural resources, especially those related to energy 30 years ago. The term itself is very young and was imposed in the summer of 1992, after the Conference on Environment and Development, organized by the United Nations in Rio de Janeiro, Brazil.

Most human beings aspire to achieve economic development to secure rising living standards and to protect and improve the environment, both for themselves and for future generations. The reconciliation of these two aspirations represents the core of the concept of sustainable development and it is synthesized through the dualism of ecosystem-eco-efficiency.

The tools that the state uses to achieve the sustainable development policy are: economics (taxes, fiscal facilities, negotiable pollution permits), legal (regulations, norms, laws), technical (stimulating research and development to promote clean technologies, for energy saving). As economic instruments, the following can be mentioned: ¬ fiscal instruments; ¬ market instruments; ¬ financial instruments; ¬ taxation systems.

Sustainable development involves achieving three objectives, namely: economic growth, social welfare and environmental protection. (**Fig. 1)** For the development of a sector of activity and of the society as a whole, all these goals must be achieved.

Fig 1-Principles of sustainable development



Both environmental protection and economic activity affect the quality of life. Often, economic investment and environmental protection go hand in hand, they converge. Economic development is achieved not only to meet basic material needs, but also to provide resources to improve the quality of life in areas such as health, education and good environment.

Many forms of economic development appeal to the environment, in the sense that they use natural, energy, material and information resources (resources that are often limited) and generate polluting products and environmental damage. But at the same time, there are many ways in which certain types of economic activity can protect or improve the environment.

These include measures to make more efficient use of natural resources, energy, materials, information, minimize damage to the environment (polluting technologies, technologies with low material and energy consumption, waste recovery technologies, biotechnologies, etc.) environmentally friendly agricultural practices, better use of land and constructions, improved transport efficiency, etc.

One of the major challenges of sustainable development is to find ways to encourage ***environmentally friendly economic activities*** and to discourage activities that cause environmental damage (air, water and soil pollution).

Because the environment and its resources are shared between various users, collective action is needed to broaden their protection and savings.

Decisions on economic development must be made taking into account the costs of potential pollution and damage to the environment, as well as the assessment of the sources that are consumed and, by conversion, the value of any improvements to the environment. However, it is often difficult to determine what the environmental costs are, how much resources can be used without affecting their regeneration, and what benefits exist or will be provided as a result of some human action.

Thus, through domestic efforts and international cooperation, governments must set and protect environmental boundaries and stimulate corporate creativity in order to create a sustainable and modern society.

The environment is treated as a free good, available to all participants in activities of all kinds (not just economic). A key objective of sustainable development policies is to prevent this situation by ensuring that all costs and benefits are shared fairly.

The objective considered in establishing the major economic decisions in the public and private sectors, within a management regarding the natural and energetic resources, the economic activities are carried out on two strategic and integrated directions of sustainable development, on all levels (local, regional, national and global).

Mainly:

- rational use of natural resources through eco-technologies of economic processing (reduction and recycling of waste), respectively reduction of consumption;
- using unconventional energy sources. Currently, the emphasis is on the rational use of natural and energy resources, thus becoming an imperative of the present.

Along with these, material and information resources complete the set of sustainable development resources.

Environmental indicators

The interest shown for a sustainable development, as an alternative to the obvious process of environmental deterioration, requires more and more countries to re-examine the possibilities of assessing and monitoring the state of natural ecosystems, to detect the causes and trends of changing their functionality. However, environmental indicators are considered as a necessary tool in designing the strategy for sustainable development. In principle, it is not possible to speak of a system of universally valid indicators, which must correspond to the conceptual framework and to the specific purposes, promoted in time and space.

Beyond the differences in nuance or content, according to studies developed under the auspices of the OECD, such a system of indicators must contribute to: - assessing the state of the environment in accordance with the intensity of changes in its quality, with objectives defined by national policy and international agreements.

The relevance of environmental indicators is of great importance for the observance of the "public's right to know" about the trends in the evolution of water and air quality, of other aspects of the environment that have implications on the health and well-being of the population; - integration of environmental interests in sectorial policies.

This is done by extending the system of sector indicators that show the progress made in environmental protection, as well as by the links between economic policy and trends in key sectors (agriculture, energy, transport, etc.), on the one hand and the environment on the other; - integration of environmental interests in more general economic policies, through environmental assessments, especially at the macro level.

Environmental indicators can be grouped into two main categories (**Table 1**.): - environmental quality indicators; - source (emission) indicators.

Table 1. Environmental quality indicators

Environmental characteristics	Indicators
1. The physical environment	- dispersion capacity
1.1. Inert environment	- the load with contaminated substances
-atmosphere	- unwanted odors
- air quality	- climatic welfare indices
- climatic comfort	- favorable climatic indices for tourism

The biunivocal character of the environment-economy relationship

Any economic process evolves between two poles - production and consumption - in the relationship of interdependence and of recognizing the active role of each of them. Production involves input of raw materials, materials, etc. and a system of technologies that transforms with a certain efficiency these inputs into consumer goods, within specific, strictly necessary channels, but also of some adjacent channels. The "environment - economy" relationship has two components [8].

- the shape of raw materials, production space, energy, biodiversity which is a "valve" for the environment. This "valve" is defined in relation to the potential availability of a required stock, which means that the environment provides support for economic inputs within certain limits.
- environmental stocks, involved in maintaining the ecological balance, whose structure can change with qualitative changes in technology.

The "economy - environment" relationship also has two components:

- a material "message" to the environment, represented by emissions, waste, physical degradation, etc. result from the production and consumption activity, whose size depends on the performances of the two poles;
- the set of effects induced by the material "message" of the economy to the environment, dependent on its successive phases: if the "message" is addressed to fragile areas, the effects are greater, and if it is addressed to areas with stable functionalities, the effects are smaller.

Of course, the intensity of the effects also depends on the level of the "message". When it exceeds the recycling capacity of the environment (the recycling function is not a specific function of the environment, but an adaptation, which involves additional energy consumption, exerting pressures on the energy flow of an ecosystem), the phenomenon of real pollution occurs, which affects the specific functions of the environment.

At a general level of analysis, in the field of economics two disciplinary approaches have been developed in recent years to address environmental challenges: ecological economics and environmental economics. Although different, they are complementary.

Green economics uses a wide variety of methodologies (including neoclassical), depending on the objective of the research, while **environmental economics** is based exclusively on the paradigm of neoclassical economics, which emphasizes maximizing human well-being and using economic incentives to determine changing destructive human behavior. Moreover, we can add here the **"evolutionary economy."** Evolutionary principles are applied to study economics in an attempt to provide an alternative analytical framework in relation to the neoclassical principles of economic analysis, which gained importance in the twentieth century; thus, economists in all schools of thought have tried to think of the economic system as a product of an evolutionary process [7]. Although none of these three relatively new disciplines seems to provide a generally accepted system of thinking to address environmental issues, they can provide

an indication of how we should look at these complex challenges. Although they have common features, the ecological economy is closer to the evolutionary economy than the conventional and more limited environmental economy, as shown by the schematic comparison between them, presented below **(Table 2)** [9].

Table 2 The main differences between evolutionary economics, ecological economics and environmental economics

Evolutionary economics	Ecological economics	Environmental economics
➢ Evolutionary capabilities ➢ Diversity of agent, technique and product ➢ Innovation-recombination / mutation ➢ Adaptation / Evolutionary stability ➢ Limits of adaptation ➢ Dependence on previous elections ➢ Various time periods ➢ Population / distribution indicators ➢ Limited rationality and selection ➢ Functional morality ➢ Adaptable individuals and systems	➢ Optimal level ➢ Biodiversity ➢ Different opinions on innovation ➢ Equity (intra / inter-generational) ➢ Resilience ➢ Growth limits ➢ Ecological irreversibility - Long and medium periods of time ➢ Physical and biological indicators ➢ Behavior without clairvoyance ➢ Environmental ethics ➢ Causal processes	➢ Optimal allocation ➢ Representative agents ➢ Optimal research and development ➢ Efficiency, cost-effectiveness ➢ Macro sustainable growth ➢ Increasing limits ➢ Economic irreversibility - Short and medium periods ➢ Monetary indicators ➢ Rational behavior ➢ Utilitarianism ➢ Balance, static / comparative dynamics

Source: *Adapted by Jeroen C. J. M. van den Bergh, "Evolutionary thinking in environmental economics", Journal of Evolutionary Economics, Springer, vol. 17(5), October 2007, pp. 521-549.*

Both environmental and ecological economics are concerned with the relationship between ecosystem and resource management, trying to identify the causes and characteristics of environmental problems and their solutions. However, environmental economics focus its analysis on the neoclassical principles of rational choice in the context of resource scarcity, while the ecological economy combines elements of economics, ecology, geography, political science, thermodynamics, ethics and many other natural or social sciences. From an economic point of view, the environment is an economic asset.

On the one hand, this special resource provides the economy with the raw materials - which are transformed, through production activity, into goods and services - and the energy - which fuels the transformation process. After their transformation through production and consumption activities, these raw materials and energy are returned to the environment as waste, in a continuous cycle. On the other hand, this resource provides basic services directly to consumers, for example air, water, food, shelter, etc [13].

In response to the requirements of adapting the economy to the new requirements, the **Creative Economy developed**.

The modern economy cannot be based only on routine elements; the focus is mainly on imagination, innovation and creativity [6]. The economy of the future will certainly be creative and innovative. Moreover, from a historical point of view, this stage represents a new economic cycle, preceded by those of the agrarian economy, the industrial economy and the economy based on the provision of services.

The world economy is entering a new stage of much more dynamic and creative development. It went from an economy based exclusively on: agriculture, to the industrial economy, then to the economy based on services and not long ago to the one based on knowledge. The economy of the new decade will also be a creative economy.

In the last ten years, the turnover of creative production and services has more than doubled and reached 624 billion US dollars. In addition to the economic benefits, the creative economy creates intangible values and ensures sustainable development centered on the human being.

The term "creative economy" is defined as all persons and enterprises that produce artistic and innovative cultural products and services. This system also includes those spaces where creators can freely present their works, receive comments on them and exchange ideas.

The main feature of the creative economy is that people use their imagination to increase the value of an idea. John Howkins invented the concept of the creative economy in 2001 to describe economic systems in which value depends on originality and creativity, and not on traditional resources such as land, labor and capital. Unlike the creative sectors, which are limited to certain specific sectors, the term "creative economy" describes the creativity of the economy as a whole [14].

More specifically, new ideas, not money or technology are the source of success today and, more importantly - the source of personal satisfaction. A creative economy breathes new life into production, services, trade and entertainment and with positive effects on the environment. It changes the environment in which people want to live, work and study, but also the environment in which people think, invent and create [15].

The creative economy is a rapidly growing sector of the world economy. This sector is dynamic in generating revenue, creating jobs and developing export activity, as it is less dependent on material resources. Pierre Luigi Sacco - economist also emphasizes that the creative economy best reflects local characteristics and preserves identity in an era of globalization. In his opinion, Île-de-France in Paris, Inner London and Milan are the places where the creative economy develops most actively.

A country cannot develop routinely, but because of creative ideas. The economy of the new decade will be a creative economy.

In the context of current changes and the knowledge-based economy, a new method of measuring the competitiveness of a country or a city appears, starting from the "3 T" of economic growth: TECHNOLOGY, TALENT and TOLERANCE (Richard Florida - "The Rise of Creative Class"). Or, talent and tolerance are not bought with money, they are educated. Education belongs not only to one government or another or to any public/private partnership (all this helps enormously, when they are thought together and carried to the end), but, especially, to each of us [16].

The creative industries, through the wide range of fields they cover - from traditional arts to design and video games - are the ace up their sleeves that offer great economic potential to seemingly desolate economic regions. We aim to capitalize on and reintegrate new regions into the value-producing economic circuit. The ability to innovate, in combination with the training effects generated in other areas of activity, places creative industries as vital to the long-term health and competitiveness of the entire economy.

The creative industries are among the most dynamic sectors in Europe. They accounted for 3.3% of EU GDP in 2010. It was predicted that the creative industries would be the new economic engine in the next 10-20 years in the world. Romania cannot be passive to these changes that appear at international level [17]. As such, the premise of the research is the need to use a model for measuring the creative economy that can ensure the comparability, at least in Europe, of the results obtained. Regardless of how the creative industries are defined, there is no controversy that all of them form what is broadly referred to as the "creative economy". Similar to the creative industries, there is no unanimously accepted definition of the creative economy. It is a subjective concept, still in full process of modeling and contextualization. Although the definitions of "creative economy" differ, it tends to be unanimously accepted that its central element is the creative industries. Our approach to creative industries has sought to expand the acceptance of the concept of "creativity" to allow the inclusion in the category of creative industries not only of those activities that have a strong artistic component, but also of any other economic activities that contribute when creating products with a significant content in intangible assets, embodied, in principle, in intellectual property rights. Examples of industries with great creative potential: Advertising, Software, Web, IT Solutions Architecture, Design, Printing, Publishing, Translation and Interpretation, Art and culture, Sports and entertainment, Crafts, Media but all industries can develop this creative side so as to reduce the polluting impact on the environment [19].

One of the main global trends of the creative industries is to get closer and closer to the general trade dynamics of any other economic sector. Thus, as can already be seen on a world scale, the specialization of some states in the import of creative products and others in their export is visible, but there are also states with high incomes from natural resources that are reluctant to develop a creative economy [18].

By adopting and developing the creative economy, the impact on the environment will be reduced by:

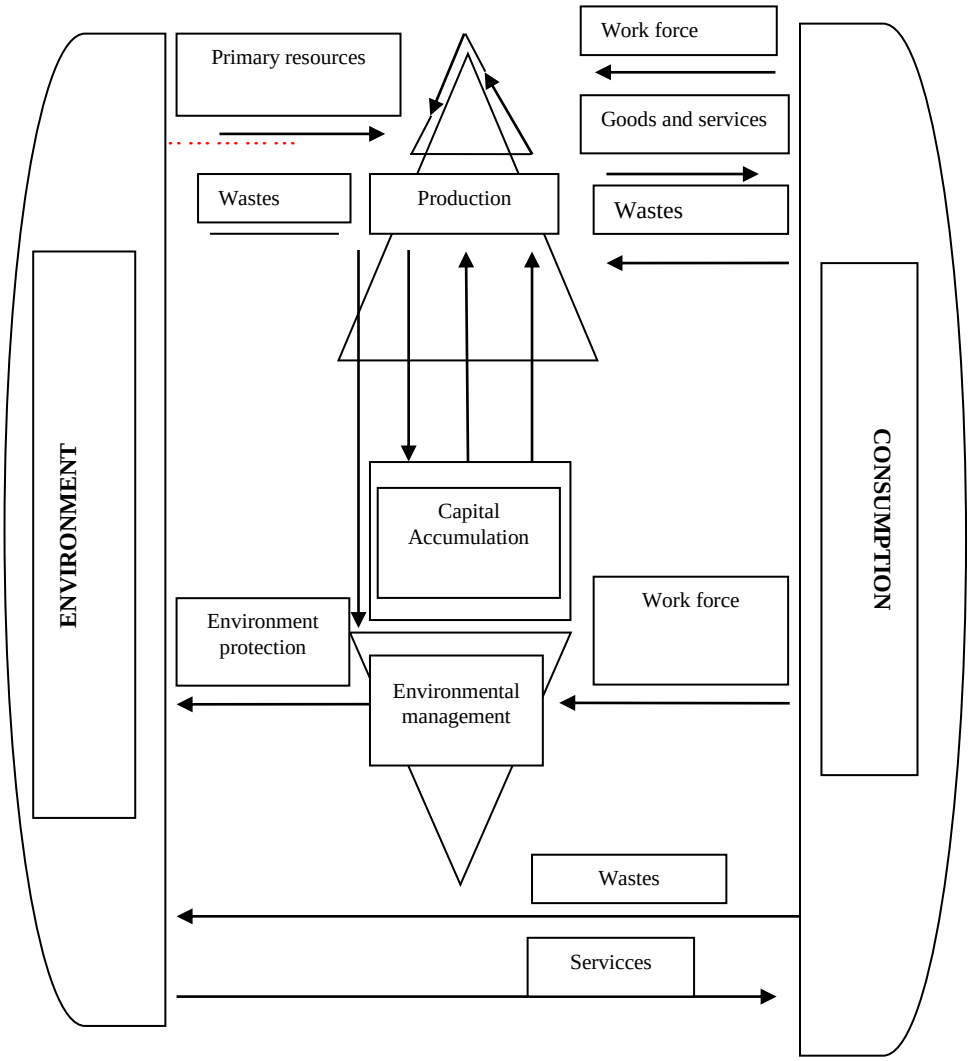
- **efficient use of resources**; we will actually have to get more out of less and thus reduce the amount of resources we extract and use.
- **efficiency of the flow of new materials in the production processes**; the research of new materials and less polluting technologies will have to be developed.
- **reduction of material losses and waste generated during production and consumption**.

Transforming our economy is possible, but to do so requires measures and commitments that span decades. Europe has made significant progress in increasing resource efficiency, but much remains to be done [12], [13].

Fully implementing such policies would provide many benefits. Fewer resources would be used for production, and this would contribute to the protection and conservation of the environment. At the same time, the economy would benefit from fundamental innovations and greater competitiveness for private companies.

From an unconventional point of view, this will integrate the economic study of environmental degradation phenomena (only partially reflected in the market system), in order to correctly assess the negative activities / benefits to the environment. A model of material flows can be used in order to highlight the importance of the economic approach to the environment in terms of integrating the creative concept [11].

Fig.2 Material flow



Source: *Adaped by Karl-Göran Mäler: Environmental Economics Univ.Press, London, 1974).*

In such a model it is tried to follow the circular flow of the matter [10], starting with its condition of primary resource taken from the environment and until its discharge in it, in the form of residue passing through the production and consumption phases. According to the model of Karl - Göran Möler (**Fig. 2**), five basic sectors can be considered: - production; - capital accumulation; - consumption; - environmental management; - environment. The model therefore includes an "Environmental Management" sector, for the operation of which labor and other resources from the "Production" sector are consumed; these consumptions are materialized through the actions of environmental protection.

The primary resources extracted from the environment are used directly by the productive sector, and the necessary labor input is represented in turn. The "Capital accumulation" sector refers to the capital stock in the economy, which offers productive (creative) services, usable as a factor of production. The "Consumption" sector is identified with the consumption of goods and services, coming directly from the "Production" sector.

Conclusion

Through this article, the author have tried to highlight the definitions of certain terms related to economy / environment, to present certain specific indicators and to present solutions by approaching certain realistic models.

In such an approach, anyone would be overwhelmed by the multitude of information, the diversity of opinions, the variety of approaches or the range of solutions at the time of initiating the study. It is, of course, true that this diversity includes a wide range of issues and different ways of examining various issues. Each of these approaches mediates the understanding of only part of the problem. Moreover, as already mentioned, environmental challenges range from pollution, climate change, to biodiversity loss, and although these issues are interrelated, they are usually addressed separately. The objectives of all entities should be similar and focused on eliminating negative impacts on the environment. However, generally speaking, a general conclusion is that goals are different to the extent that societies seek economic growth, economic entities pursue profit, and individuals strive for personal well-being.

Although these different objectives can be integrated into the broader concept of "general well-being", ultimately their reckless productive and consumption activities will lead to the consumption of natural resources and, as a result, the transformation of nature. Most authors in fields related to environmental protection draw attention to the rapid depletion of the stock of natural shrubs with industrialization and, predominantly, in the post-industrial phase of the evolution of human society.

Exploitation of resources beyond a certain limit can cause a major imbalance of the ecosystem, with consequences that cannot be quantified. Although technological advancement has led to a continuous adaptation of humanity, including the creation of new resources that are not naturally found in nature, the unprecedented increase in the world's population may put more pressure on the ecosystem, with unknown effects yet. Returning to the main issue, it can be said that there is no single or simple way to

understand and assess the impact of human behavior and economic activities on the environment, and no sure way to develop a strategy to reduce this impact.

Therefore, clarity is crucial to discern in this confusion created by the diversity of theories, disciplines, opinions, strategies, problems or solutions. And more studies from an evolutionary perspective are likely to be needed to understand how mankind has faced, over the course of its history, insufficient resources and growing needs in order to identify a future course of action.

According to the model of Karl - Göran Möler applied in case of a possible quantification of the adoption and development of the creative economy as a means of rethinking the economy so that the effects on the environment are diminished; it was found that the net material flow is equal to the net capital accumulation. Seemingly simple, this conclusion is significant insofar as it clearly shows that the share of primary resources that do not accumulate in the capital stock is permanently returned to the environment.

Another conclusion is that, given the net accumulation of capital, given that there are no incentives to reduce the volume of polluting discharges into the environment, natural sampling will be done in an excessive manner.

Therefore, if the quality of the environment is "disregarded" politically, the economy will suffer not only as a result of environmental degradation but also due to the abusive exploitation (overexploitation) of natural resources; in other words, if the discharge of residues into the environment is not kept under control, this will lead to an increasing increase in withdrawals from the stock of natural capital and it will not be possible to maintain the net accumulation of capital.

The described approach confirms the need to regularize the exchanges between natural and economic processes. In this sense, the Environmental Economy aims to ensure the substantiation of decisions on productive and social capital in accordance with the characteristics of natural capital, including based on ecological, economic and social accounting both in the short and long term.

Even if the goal of Environmental Economics also includes broader objectives, such as improving the quality of life, one of the main objectives remains the efficient management of natural resources, increasingly subject to appropriation and increasingly rare. Moreover, Karl-Göran Moler's model suggests a reconceptualization of the economic mechanism in order to identify means, tools for allocating resources between alternative uses.

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