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Table of Contents

CSRR Based Compact S-Shaped Dual-Planar Electromagnetic Bandgap Microstrip Low-Pass Filter

Deepti Gupta[1], Dr. P.K.Singhal[2], Anamika[3], Anubha Nakra[4], Kajal Sharma[5]

[1,3,4,5]Hindustan College of Science and Technology (HCST), Farah, Mathura, India

[2]M.I.T.S, Gwalior, India

ABSTRACT: In this paper, a new topology for the design of a highly compact complementary split-ring resonator (CSRR) based dual planar electromagnetic bandgap (DP-EBG) microstrip low-pass filter with a S-shaped geometry is proposed. With the DP-EBG configuration and the S-shaped geometry of microstrip line (MLIN), the proposed structure achieves a very sharp stopband with high attenuation and high selectivity within a very small circuit area. Its passband ripple level is negligible due to the square patch inserted in the MLIN and CSRR in the ground plane of S-shaped geometry. By introducing complementary split-ring resonator (CSRR), the selectivity and the roll-off of the microwave low-pass filter is highly improved. The proposed structure is very simple and easy to fabricate and is highly compatible with monolithic microwave integrated circuit (MMIC) technology.

KEYWORDS: Complementary split-ring resonator (CSRR), Electromagnetic bandgap (EBG), low-pass filter.

1   INTRODUCTION

The electromagnetic bandgap (EBG) structure has been a term widely accepted in today's time to name the artificial periodic structure that prohibits the propagation of electromagnetic waves in certain frequency bands at microwave frequencies. These periodic structures were originally proposed at optical frequencies [2]-[4] and are called as photonic bandgap (PBG) structure or photonic crystal (PC). Analogous to crystals where periodic arrays of atoms produce bandgaps in which the propagation of photon is prohibited, an artificial periodic structure consist of periodic macroscopic cells. These periodic structures are scalable over a large frequency range in the electromagnetic spectrum. Due to this scalability, research has advanced into the range of microwave and millimeter wave.

The distinctive feature of EBG structure is the existence of the bandgap where electromagnetic waves are not allowed to propagate. They have been extensively applied to the substrate of microwave circuit such as patch antennas and power amplifiers to enhance their performance [6]-[7]. The introduction of the planar EBG structure, where two-dimensional (2-D) periodic elements are inserted in the ground plane or the microstrip line (MLIN), simplifies the fabrication process of EBG structures while keeping a similar control on the wave propagation to that of an electromagnetic crystal where three-dimensional (3-D) periodic elements are organized in a host medium The only compromise of planar EBG structures is that they are not able to control the propagation of waves in the entire 3-D space. However, planar EBG structures have appealed much consideration because of their prominent stopband characteristic, their ease of fabrication, and their compatibility with monolithic circuits.

In previously proposed straight 1-D EBG microstrip structure [8], stopband performance obtained is good and can be upgraded by increasing the number or size of the EBG cells, thus resulting in an enlarged circuit area. They show a compromise between good filtering performance and small physical size [9]. The problem above faced was solved by inserting multiple bands in the MLIN giving rise to an EBG filter structure with great rejection band in a relatively small

physical size. The circuit area can be reduced by proposing a dual planar EBG (DP EBG) configuration where EBG cells are in both the MLIN and ground plane to obtain good filtering functionality.

Previously, some designs have been proposed with a U-shaped geometry to diminish the circuit area compared to the straight microstrip line structure. But those structures are complex and involves various tapering. Also, the attenuation obtained at the stopband is not so appropriate. Therefore, to reduce the circuit area and increase the attenuation performance an S-shaped geometry is proposed which is highly compact.

In this paper, a high-performance CSRR based compact DP-EBG microstrip low-pass filter structure with a S-shaped MLIN geometry is proposed and implemented. Introducing the Complementary split-ring resonator (CSRR) [10]. The selectivity and the roll of factor of the microwave low pass filter in improved. The CSRR particle does not require any extra space and for this reason it is highly suited for constructing an miniaturizing microwave devices. The CSRR element has mainly been utilized for stopband filter design and to eliminate the unwanted spurious mainly in microstrip structures. Moreover, this particle has also been successfully integrated into passband filters too.

The proposed structures are simulated using CST microwave studio suite 2010. The substrate used is FR-4 Lossy (normal) with a dielectric constant $\in_r$ of 4.4 and a thickness of 1.6mm. the center frequency of the stopband f_0 is set to 1.8GHz.

2   COMPARISON OF S-SHAPED GEOMETRY WITH U-SHAPED GEOMETRY

When a S-shaped microstrip filter is designed with the same microstrip length as that of the U- shaped geometry it is found that the circuit area of S-shape is reduced by 12%. Also, the response of S-shaped geometry is better than that of u-shaped geometry.

Figure 1(a) and 1(b) shows the schematic of a U-shape EBG microstrip structure and S-shape EBG microstrip structure respectively.
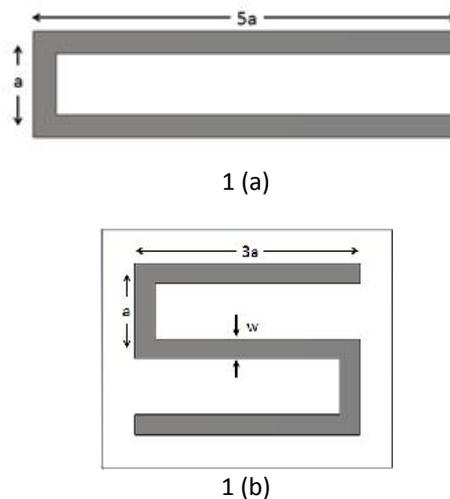

1 (a)

1 (b)

Fig. 1. Schematic of: 1(a) U-shaped MLIN and 1(b) S-shaped MLIN
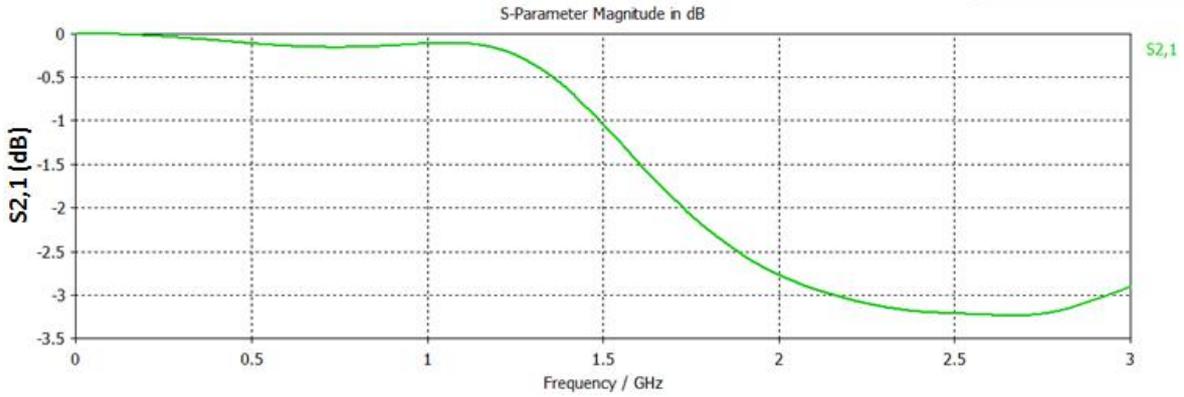
3   DESIGN OF S-SHAPED GEOMETRY

Fig.1(c) Schematic of Simulated S-parameter of S-shaped MLIN.

S-Shaped EBG Microstrip Structure:

Fig. 1(b) shows the schematic of a S-shaped EBG microstrip structure with five microstrip lines.The length of microstrip lines M1, M3 and M5 is 3a and the distance between the two parallel sections is a.

the straight EBG microstrip structure is figure 1(b) satisfies the Bragg reflection condition [8], which is expressed by the following equation

$$\beta.a = \pi \qquad (1)$$

Where β is the wave number in the substrate material and a is the period of the structure.

Since, $\beta = 2\pi / \lambda_g$ where λ_g is the guided wavelength corresponding to the center frequency of the stopband f_0, f_0 is decided by

$$f = \frac{c}{2a\sqrt{\in_{eff}}} \qquad (2)$$

Where c is the speed of light in free space and $\in_{eff}$ is the effective dielectric constant. The straight EBG microstrip structure is not a conventional stepped-impedance microstrip low-pass filter[1].

TABLE 1
PARAMETERS OF THE PROPOSED LOW-PASS FILTER

Parameter	Dimension
W	3.05897498 mm
A	11.41623883 mm
Cut-off frequency (f)	1.8 GHz
Height of substrate (h)	1.6 mm
Substrate used	FR -4 (lossy)
Z_0	50 Ω

Since, $a = n.\dfrac{\lambda_g}{2}$

Where, n is any real valueTaking $n = \dfrac{1}{4}$

A S-shaped structure is proposed with $a = \dfrac{\lambda_g}{8}$

Where the horizontal MLIN has a length of 3a and a vertical MLIN has a length of a (center to center) and a width of w.

4   S-SHAPE WITH RING IN THE GROUND PLANE

When a ring is etched in the ground plane of S-shaped MLIN structure as shown in figure 2(a) and 2(b), it is observed that a low-pass filter response is obtained with a transmission loss of 30dB at 1.25GHz frequency. Cut-off frequency obtained at 3dB point is 0.93GHz. the filters roll-off is not so good.

2(a)

2 (b)

Fig.2 Schematic of: 2(a) S-shaped MLIN structure with ring etched in ground Plane, 2(b) Simulated S-parameter of structure.

5   S-SHAPE WITH CIRCLE IN THE GROUND PLANE

3(a).
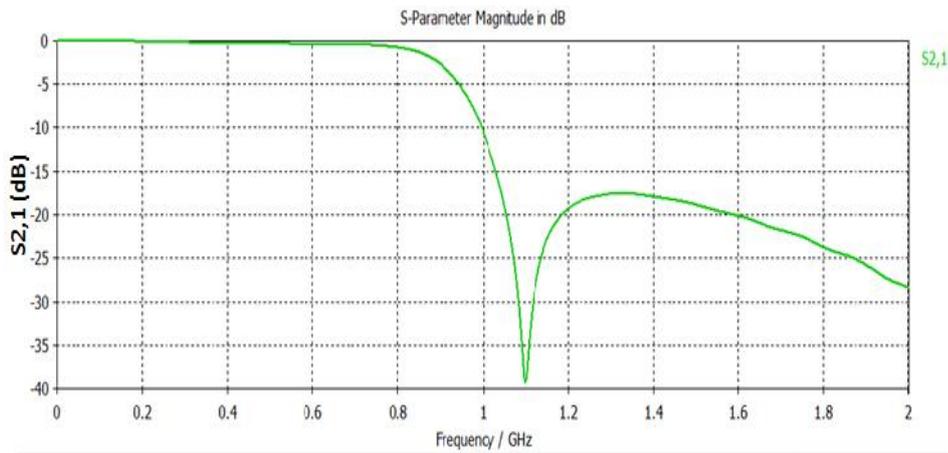
3 (b)

Fig.3 Schematic of: 3(a) S-shaped MLIN structure with circle etched in ground Plane, 3(b) Simulated S-parameter of structure.

Figure 3(a) and 3(b) shows S-shaped MLIN structure with a circle etched in the ground plane and its response respectively. When a circle is etched in the ground plane of S-shaped MLIN structure, it is observed that the response obtained is better than that of the ring structure in the ground plane. The transmission loss attained is 39dB at 1.1GHz with a improved roll-off. The cut-off frequency at 3dB is 0.91GHz. But the selectivity of the response is not satisfactory.

6   S-SHAPE WITH CSRR IN THE GROUND PLANE

4(a)

4 (b)

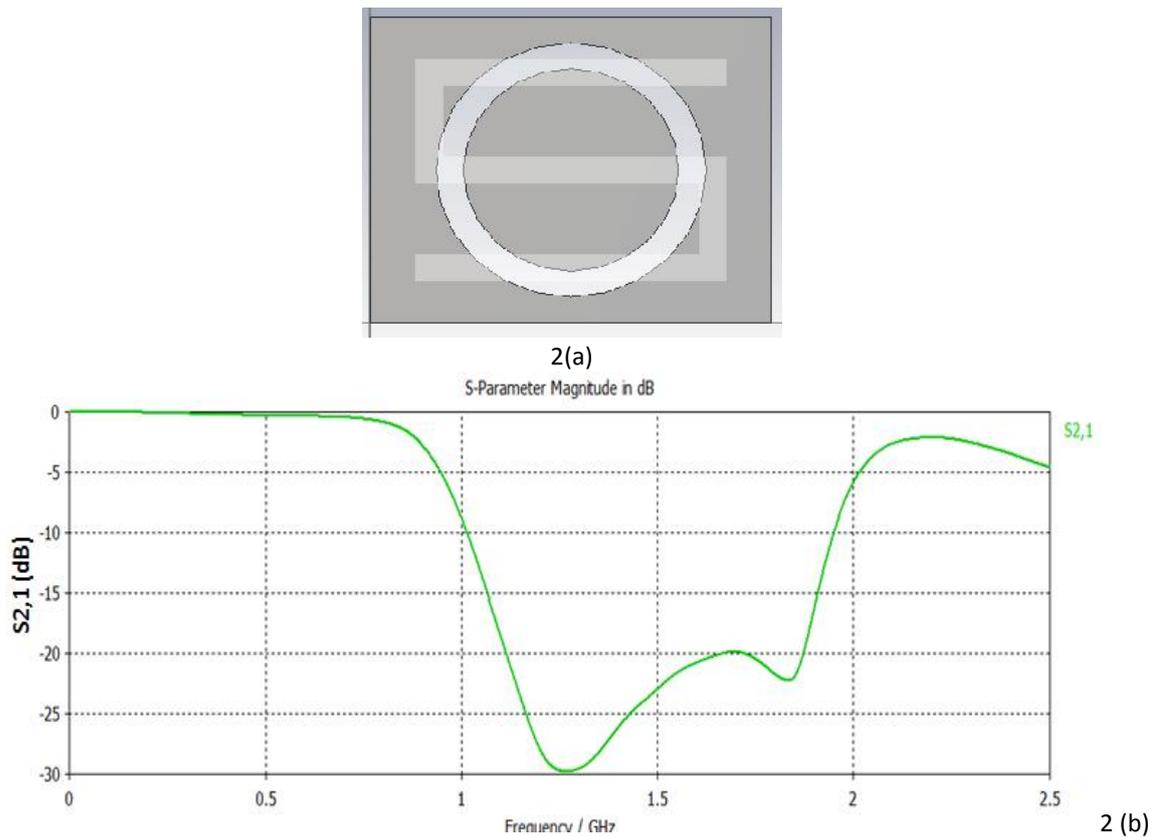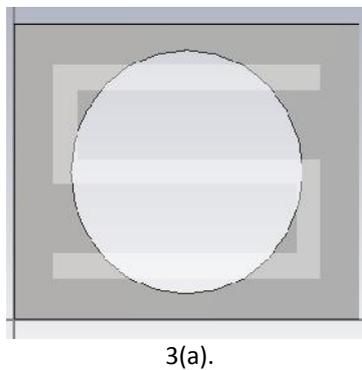*Fig.4 Schematic of: 4(a) S-shaped MLIN structure with circle etched in ground Plane, 4(b) Simulated S-parameter of structure.*

When a CSRR is etched in the ground plane of S-shaped MLIN structure as shown in figure 4(a), it is observed that the response obtained has a transmission loss of 45dB at 0.9 GHz. The roll-off of the filter is significantly improved. A narrow stopband is obtained with a sharp cut-off. The CSRR has improved the selectivity of the microwave filter as well.

The CSRR can be described as an LC resonant tank whose resonant frequency [10] is:

$$f = \frac{1}{2\pi\sqrt{L_c C_c}}$$

the geometry of the CSRR is as follows:
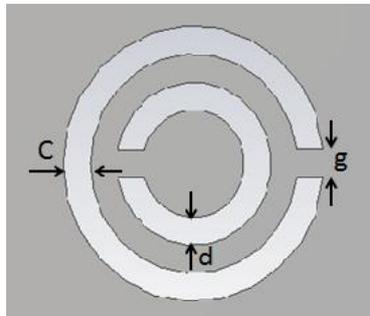
where c=d=g= 3.05897498

It is clear from the figure 4(b) that the CSRR particle at the 3dB point is 1.034GHz has a roll-off which reaches 20dB at 1.15GHz. As the CSRR particle is etched in the ground plane, the cut-off shifts to a lower frequency corresponding to a sharper roll-off.

7   S-SHAPE WITH PATCH IN SUBSTRATE AND CSRR IN GROUND PLANE
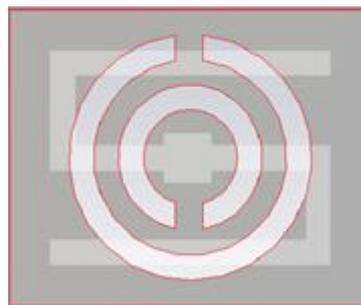
5(a)
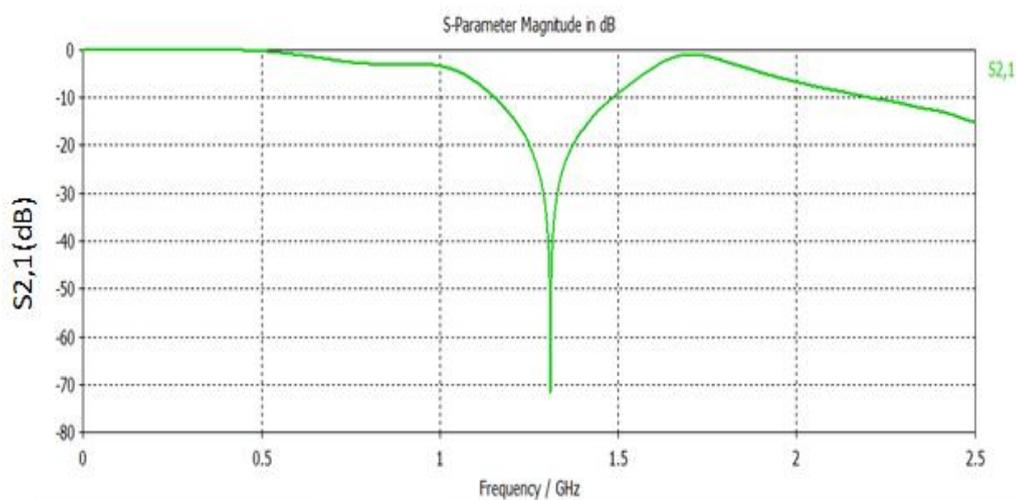
5 (b)

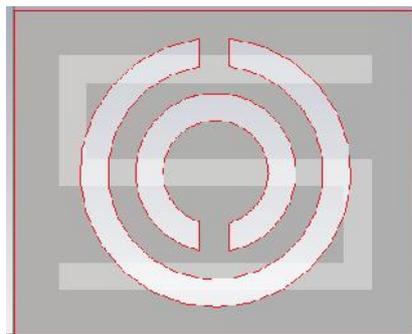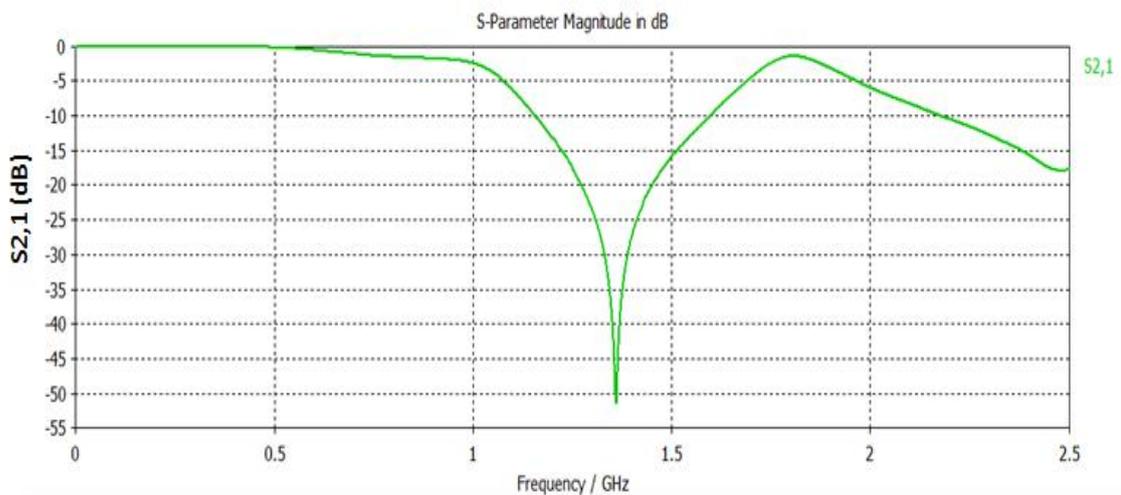*Fig.3 Schematic of: 5(a) S-shaped MLIN structure with patch and CSRR etched in ground Plane, 5(b) Simulated S-parameter of structure.*

Figure 5(a) shows the S-shaped geometry with the CSRR etched in the ground plane and a patch etched in the substrate giving it a dual planar EBG structure. In this proposed structure, the attenuation at the stopband is improved by etching the square patch on the substrate. Due to this patch, the attenuation obtained in the stopband is 72dB at 1.4GHz which was 45dB when compared with the previous structure ie figure 4(a). also, the roll-off and the selectivity is highly improved in the proposed structure due to the presence of CSRR in the center of ground plane. The response is extremely sharp with a very high attenuation.

8   PERFORMANCE OF DIFFERENT STRUCTURES WITH RESPECT TO Q-FACTOR

TABLE 2

S-shaped structure	Transmission loss at stopband (dB)	Ripple Level (dB)	Q-factor (dB/GHz)
Basic MLIN	3.3	Negligible	1
MLIN with Ring	30	Negligible	72.5
MLIN with circle	39.17	Negligible	144.1
MLIN with CSRR	51.14	Negligible	147.6
MLIN with patch and CSRR	72	Negligible	189.3

9   CONCLUSION

In this paper, the design and implementation of a high performance CSRR based compact S-shaped DP-EBG microstrip low pass filter has been presented. Due to the S-shaped geometry of the MLIN and the dual planar arrangement of EBG structure, this proposed EBG filter gains excellent stopband performance and a high selectivity in a small circuit area. The passband ripple level of the CSRR based S-shaped DP-EBG structure is extremely low. Also, the construction of the proposed structure is very simple and easy to fabricate. the proposed structure is highly compatible with monolithic microwave integrated circuit (MMIC) technology. The design of this structure is able to achieve a superior passband and stopband characterstic in compact physical size.

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IMAGERIE SATELLITAIRE ET MODELISATION DU COUVERT FORESTIER : CAS DU MASSIF DE ZOUZOUNKAN DANS LA ZONE DE TRANSITION ENTRE LE CRISTALLIN ET LE SEDIMENTAIRE AU BENIN

[SATELLITE IMAGING AND FOREST COVER MODELING : CASE OF ZOUZOUNKAN MASSIVE IN THE TRANSITION ZONE BETWEEN CRYSTAL AND SEDIMENTARY SOIL IN BENIN]

SOHOU E.B.[1], OREKAN V.[2], HOUNDENOU C.[3], BOKO M.[4]

[1]PhD student. Ecole Doctorale Pluridisciplinaire de la FLASH / UAC

[2]Maitre Assistant (CAMES) Laboratoire de Biogéographie et Expertise Environnementale / FLASH / UAC

[3]Prof Titulaire (CAMES) Laboratoire de Climatologie Pierre Pagney / FLASH / UAC

[4]Prof Titulaire (CAMES), Ecole Doctorale Pluridisciplinaire de la FLASH / UAC

RESUME: Le massif de Zouzounkan est l'un des massifs forestiers du sud Bénin dont la gestion se fait de façon communautaire en pleine zone de transition entre le socle cristallin et le sol sédimentaire. La présente étude constitue une application de l'imagerie satellitaire et de la modélisation statistique à l'évaluation des états du couvert forestier de Zouzounkan de l'année 1990 à 2010. Il ressort l'existence d'une corrélation négative entre les sols dénudés et les formations végétales du massif de Zouzounkan (-0,74 pour les forêts claires et savanes boisées et -0,33 pour les savanes arborées et arbustives). Les mosaïques de cultures et jachères induisent une corrélation négative de -0,29 aux forêts claires et savanes boisées. L'érosion des sols entraine à son tour une corrélation négative de -0,11 aux savanes arborées et arbustives. 2 fonctions linéaires d'état du massif ont été réalisées grâce à l'analyse factorielle sur la base de deux axes factoriels expliquant 100% de la variance. L'axe factoriel 1 se matérialise par une fonction linéaire f(x) = 0,997 Se + 0,969 FcSb + 0,960 Ma - 0,865 Sd - 0,778 Shs - 0,521 Mcj ; où Se = Sols altérés par l'érosion ; FcSb = Forêt claire et savane boisée ; Ma = Marécages ; Sd = Sols dénudés ; Shs = Savane herbeuse et saxicole. L'axe factoriel 2 est matérialisé par F(x) = 0,24 FcSb -0,983 Saa + 0,854; avec Saa = Savane arborée et arbustive. Du diagramme des composantes dans l'espace après rotation, on déduit que l'augmentation de 0,865 unités des Sols dénudés ou de 0,521 unités des mosaïques de cultures et jachères entraine une dégradation de 0,969 unités des forêts claires et savanes boisées. Il urge des mesures de reboisement, d'aménagement antiérosif et de veilles forestières bien organisées pour la pérennité des agroécosystèmes du massif de Zouzounkan.

MOTS-CLEFS: Massif ; Zouzounkan ; imagerie satellitaire ; modélisation statistique ; corrélation négative.

ABSTRACT: Zouzounkan massive is one of southern Benin forests whose management is done communally in the transition zone between the crystalline basement and the sedimentary soil. The present study is an application of satellite imagery and statistical modeling to the assessment of Zouzounkan forest cover states since the year 1990 to 2010 . It appears that there is a negative correlation between bare soil and vegetation massif Zouzounkan (-0.74 to clear forests and woodlands and -0.33 for tree and shrub savanna) . The mosaics of crops and fallow induce a negative correlation of -0.29 to clear forests and woodlands. Soil erosion leads to turn a negative correlation of -0.11 with tree and shrub savannah. 2 linear state functions

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were achieved through factor analysis on the basis of two factorial axes explaining 100% of the variance. The factorial axis 1 is materialized by a linear function f(x) = 0,997 Se + 0,969 FcSb + 0,960 Ma - 0,865 Sd - 0,778 Shs - 0,521 Mcj ; where Se = Soils altered by erosion; fcsb = Clear forest and savanna woodland ; Ma = Wetlands ; Sd = bare floors ; Shs = Savanna Grassland ; Mcj = mosaics of crops and fallow. The factorial axis 2 is represented by F(x) = 0,24 FcSb -0,983 Saa + 0,854 ; With Saa = tree and shrub Savannah. Frome the diagram of components in space after rotation, we deduce that the increase 0.865 units of bare floors or 0.521 units mosaics of crops and fallow causes a degradation of 0.969 units of woodland and savanna Woodland. Urgent mesures of reforestation, erosion control and forest eve well-organized are essential for the sustainability of massive Zouzounkan agroecosystems.

KEYWORDS: Massive ; Zouzounkan ; satellite imagery ; statistical modeling ; negative correlation.

Introduction

La déforestation, y compris le défrichement au profit de l'agriculture, est fréquemment le seul moyen d'existence offert aux agriculteurs qui vivent dans les zones forestières (Angelsen, 1999). L'hypothèse de l'irréversibilité du changement d'affectation de la terre correspond largement à la réalité de la déforestation tropicale actuelle, car la plupart des terres défrichées ne retournent pas à leur état boisé précédent (Kerr *et al.*, 2004; Vance et Geoghegan, 2002).

Pour la période 1976-1980, le taux de dégradation annuelle des forêts tropicales humides se chiffrait à environ 6,113 millions d'hectares (Lanly, 1982). La déforestation a ainsi entraîné la disparition ou la raréfaction d'un nombre important d'espèces végétales, parmi lesquelles figurent des plantes intéressantes, soit par leur rareté, soit par leur endémisme (Aké Assi et Dian Boni, 1990; Aké Assi, 1988, 1998).

Les enregistrements de données effectués dans le proche et le moyen infrarouge de l'imagerie satellitaire présentent un intérêt considérable pour des applications en région tropicale, en raison de la sensibilité de ces longueurs d'onde à la réflectance des couverts végétaux (Baret et Bruno, 1994).

Une autre possibilité de suivi à petite échelle consiste à utiliser les mosaïques d'images Landsat (WRI, 2006). Le présent travail constitue une application des imageries satellitaires et de la cartographie numérique à l'analyse spatiale du massif forestier de Zouzounkan.

Les figures ci-après (figure 1 et figure 2) présentent respectivement la couverture du Bénin en images Landsat et la localisation du massif de Zouzounkan au Bénin.
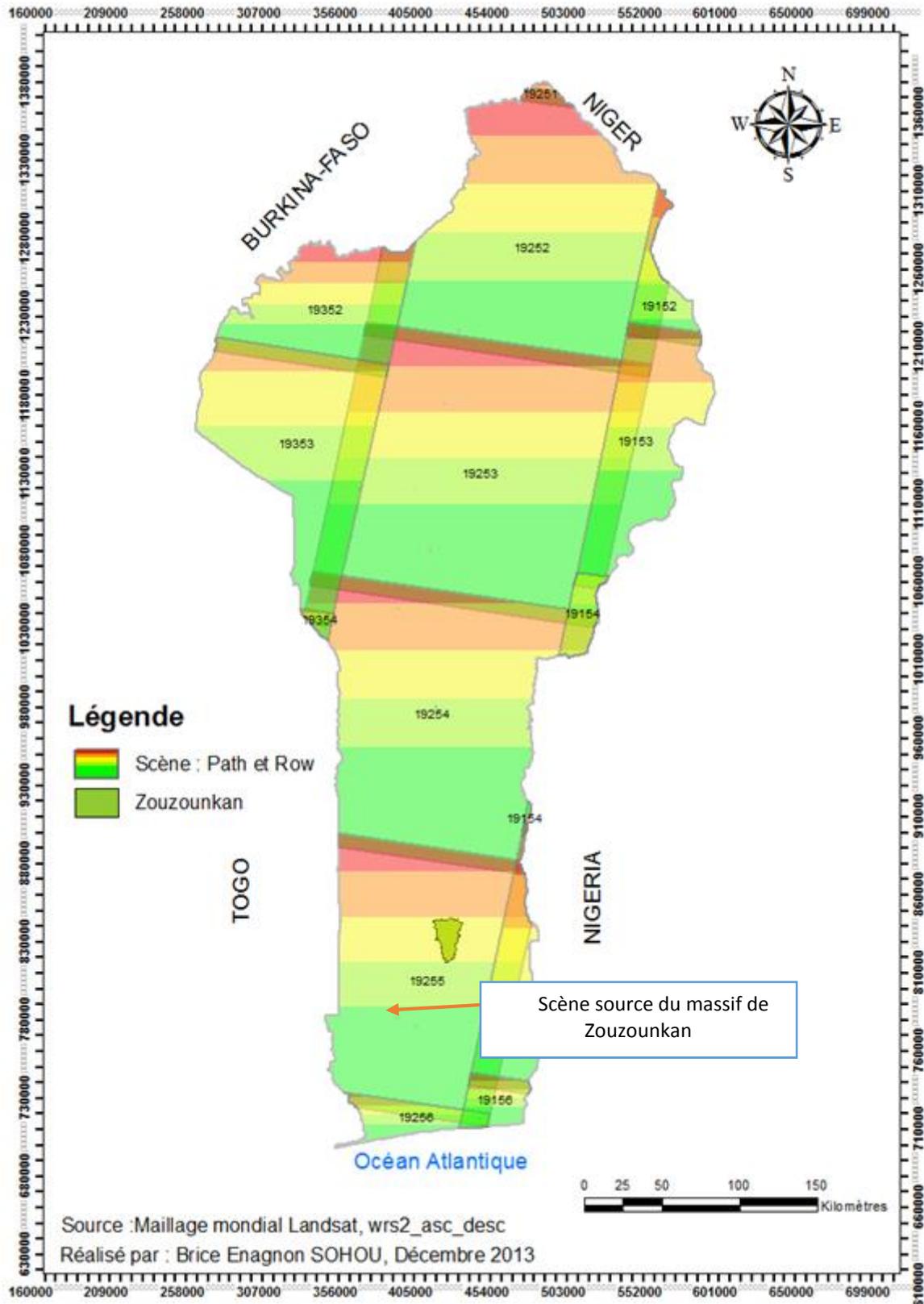
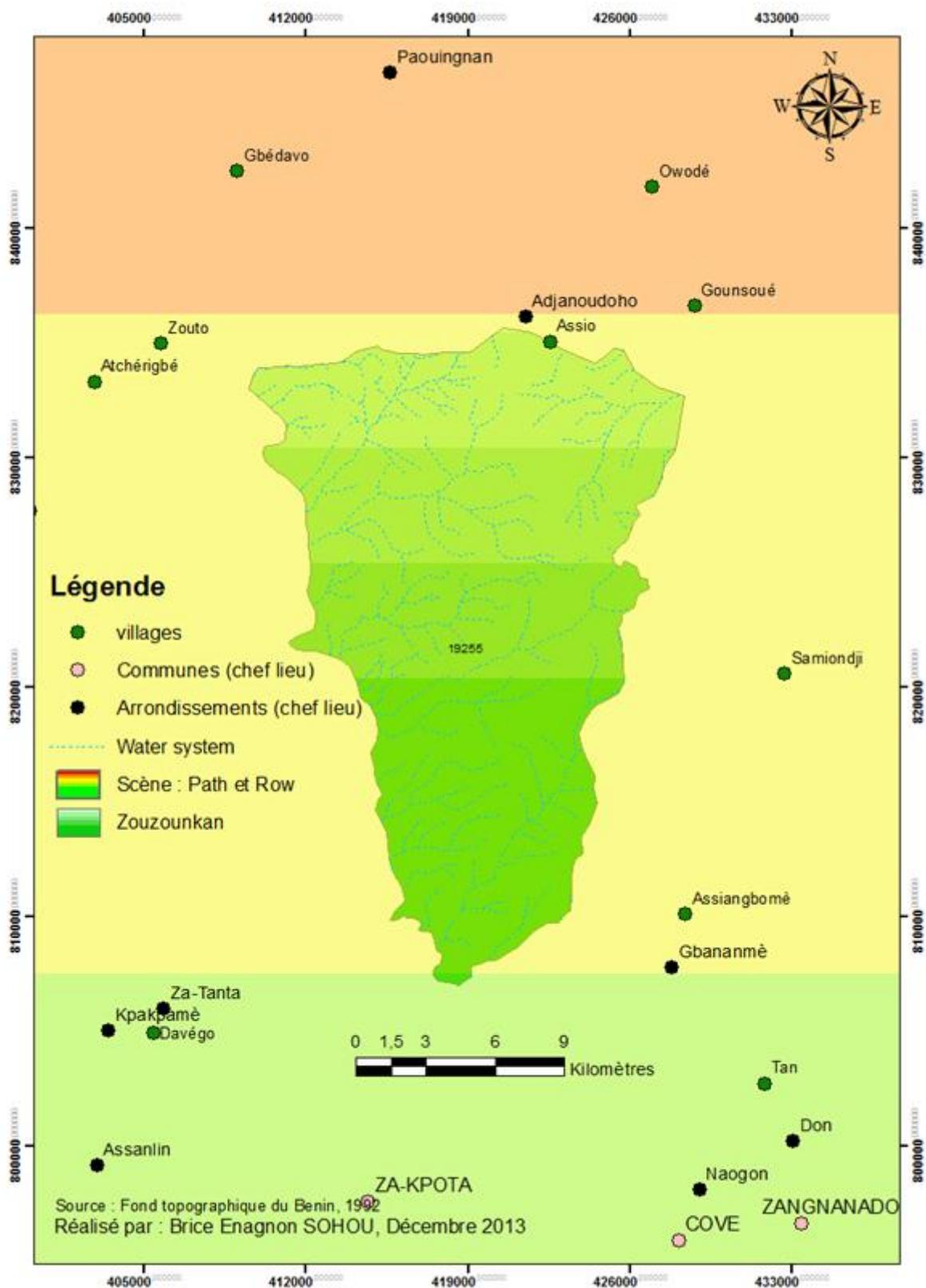**Figure 1** : Situation du massif de Zouzounkan dans les scènes Landsat du Bénin

Figure 2 : Situation géographique du massif de Zouzounkan

Matériels

Le matériel utilisé pour ce travail est constitué des logiciels SPSS, ArcGIS 10.1, Envi 5, PCL Géomatica, Excel, Word, Qgis et Idrisi Selva et un ordinateur portable HP. Le Global Positionning System (GPS) Garmin a permis l'identification des points de contrôles. Les images satellites des bandes spectrales du visible et de l'infrarouge des satellites Landsat-5 et Landsat-7 (bandes 7-4-2), pour les années 1990, 2000 et 2010 ont été téléchargées à partir du site internet de l'United State Geological Survey (USGS) sur www.earthexplorer.usgs.gov et celui du Global Land Cover Facility (GLCF) sur http://glcf.umd.edu/. La période d'acquisition d'images est celle de la régénération de la végétation (début mai/fin juin).

Méthodes

L'application du traitement d'image est axée principalement sur la classification spectrale des images satellites Landsat suivant la combinaison des canaux 7-4-2. Les techniques d'interprétation visuelle assistées par l'ordinateur ont permis un bon décodage des images. Il s'en suit la classification assistée par maximum de vraisemblances. Les fichiers dbf relevant des vecteurs de classes ont été traités dans Excel, puis insérées dans la base de données de SPSS en vue d'une analyse factorielle des composantes principales. La procédure de réalisation se présente comme ci-après : au moyen de SPSS, en cliquant sur Analyse => Factorisation => Analyse Factorielle => Analyze => Data reduction => Factor, il apparaît alors la boîte de dialogue principale pour l'analyse factorielle en composantes principales. Sélectionner les variables à factoriser, cliquer sur la flèche située au centre pour les envoyer dans le rectangle au centre droit; Cliquer sur « Descriptives » pour choisir certaines statistiques, des matrices et des tests. Ensuite => Cliquer sur « Extraction » pour Sélectionner le type de méthode de factorisation. Dans le cas présent, conserver le défaut "Analyse en composantes principales" => sélectionner dans cette même boîte de dialogues les options « Matrice de corrélation», « Structure factorielle sans rotation» (Il est toujours possible de demander une rotation des données. Mais, ici, on ne modifie rien). Cliquer sur l'option "graphique des valeurs propres » afin de représenter graphiquement les différentes variables par rapport aux composantes qui seront extraites et calculées et enfin cliquer sur, « Valeurs propres supérieures à ». Cliquer sur «Rotation»: Dans la boîte de dialogue qui s'ouvre, il est possible de demander la structure factorielle après rotation et le graphique des facteurs choisis. Cliquer sur «Facteur»: Ici, il est possible de sauvegarder les facteurs. Le bouton du bas permet de présenter la matrice des coefficients factoriels. Cliquer sur « Options" pour sélectionner des options de présentation, pour classer les variables les plus importantes et cacher celles qui n'expliquent pas les dimensions => Cliquer enfin sur « OK ».

Les résultats obtenus sont illustrés aux moyens des figures, tableaux et graphes ci-après.

Résultats

o   Présentation des images satellitaires du secteur Zouzounkan
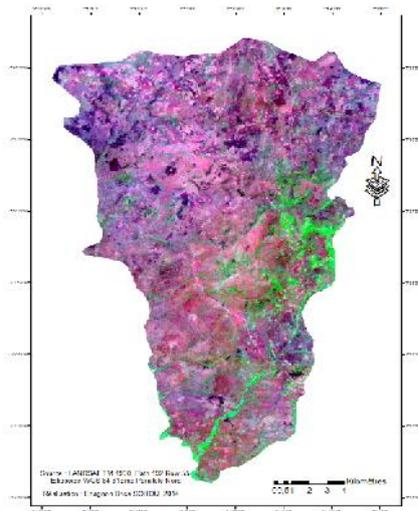

Figure 3 : Image satellitaire 1990 du massif de Zouzounkan
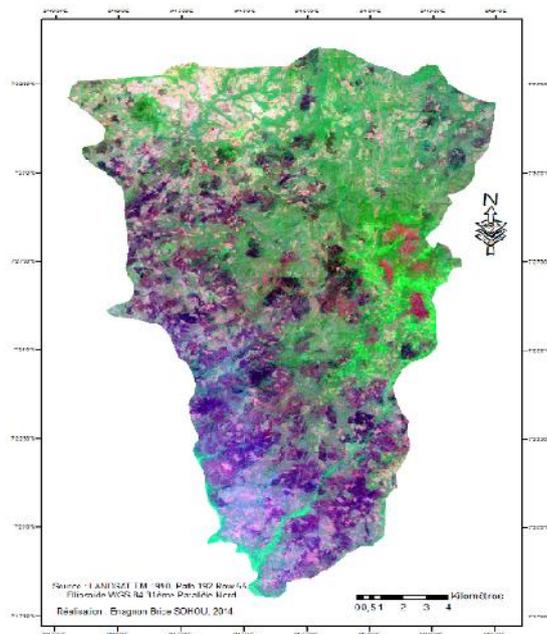
Figure 4 : Image satellitaire, année 2000 du massif de Zouzounkan
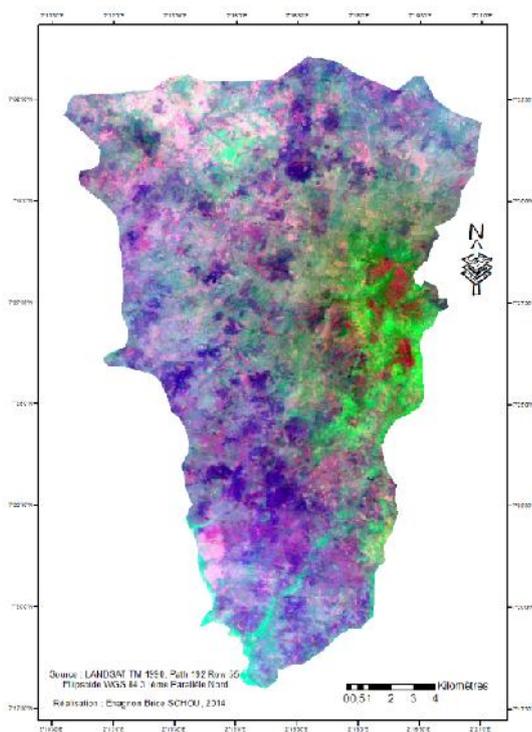
Figure 5 : Image satellitaire, année 2010 du massif de Zouzounkan

o   Résultats d'analyses factorielles

Les tableaux ci-après présentent les résultats d'analyses factorielles.

Tableau I : Résultats de statistiques descriptives des aires (m^2) d'unités d'occupation de 1990 à 2010

	Moyenne des aires (ha)	Ecart-type des aires (ha)
Forêt claire et savane boisée (1990, 2000 et 2010)	6248,3523	1606,5702
Sols dénudés (1990, 2000 et 2010)	3003,6620	1602,8065
Marécages (1990, 2000 et 2010)	2599,7289	1458,1231
Sols altérés par l'érosion (1990, 2000 et 2010)	2897,6479	1209,9441
Savane arborée et arbustive (1990, 2000 et 2010)	5081,2079	2248,3219
Savane herbeuse et saxicole (1990, 2000 et 2010)	6731,9084	8867,955
Mosaïques de cultures et jachères (1990, 2000 et 2010)	5910,6367	2740,2424

Source : Analyse factorielle des aires d'unité d'occupation après traitement d'image

Tableau II : Matrice de corrélation des aires d'unités d'occupation de 1990 à 2010 (après analyse factorielle)

		Forêt claire et savane boisée	Sols dénudés	Marécages	Sols altérés par l'érosion
Corrélation (1990, 2000 et 2010)	Forêt claire et savane boisée	1	-0,714	0,86	0,95
	Sols dénudés	- 0,71	1	-.97	-0,90
	Marécages	0,86	-0,97	1	0,98
	Sols altérés par l'érosion	0,95	-0,90	0,98	1
	Savane arborée et arbustive	-0,42	-0,33	0,10	-0,11
	Savane herbeuse et saxicole	-0,60	0,99	-0,923	-0,82
	Mosaïques de cultures et jachères	-0,29	0,88	-0,74	-0,58

Source : Analyse factorielle des aires d'unité d'occupation après traitement d'image

Tableau II (suite) : Matrice de corrélation des aires d'unités d'occupation de 1990 à 2010 (après analyse factorielle)

		Savane arborée et arbustive	Savane herbeuse et saxicole	Mosaïques de cultures et jachères
Corrélation (1990, 2000 et 2010)	Forêt claire et savane boisée	-0,42	-0,60	-0,29
	Sols dénudés	-0,33	0,99	0,88
	Marécages	0,10	-0,92	-0,74
	Sols altérés par l'érosion	-0,11	-0,82	-0,58
	Savane arborée et arbustive	1	-0,474	-0,74
	Savane herbeuse et saxicole	-0,47	1	0,94
	Mosaïques de cultures et jachères	-0,74	0,94	1

Source : Analyse factorielle des aires d'unité d'occupation après traitement d'image

Tableau III : Variance totale expliquée des aires d'unités d'occupation de 1990 à 2010 (après analyse factorielle)

Variance totale expliquée					
Composante	Valeurs propres initiales			Extraction Sommes des carrés des facteurs retenus	
	Total	% de la variance	% cumulés	Total	% de la variance
1	5,14	73,42	73,42	5,14	73,42
2	1,86	26,58	100	1,86	26,58

Source : Analyse factorielle des aires d'unité d'occupation après traitement d'image
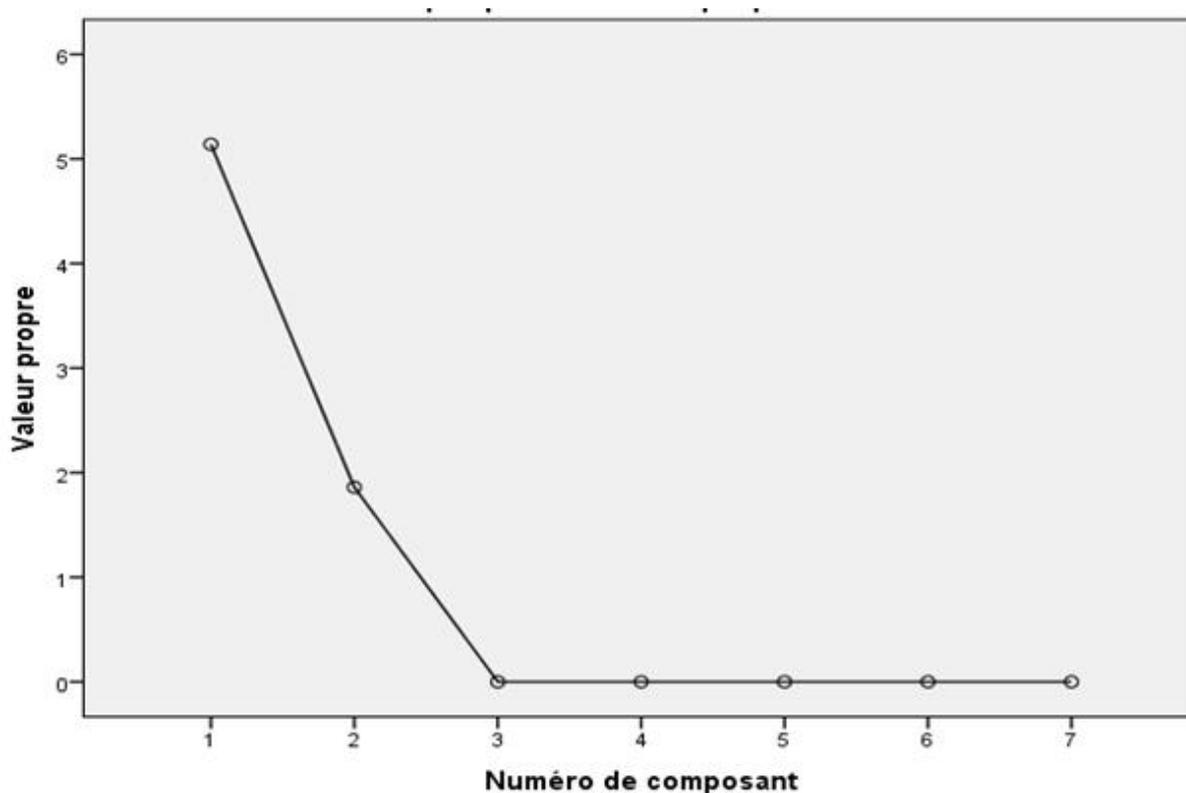
Figure 6 : Graphique des valeurs propres d'analyse factorielle

Source : Analyse factorielle des aires d'unité d'occupation après traitement d'image

Tableau IV : Matrice des composantes d'analyse factorielle des aires d'unités d'occupation de 1990 à 2010

	Composante	
	1	2
Sols dénudés	-0,997	0,073
Marécages	0,986	0,167
Savane herbeuse et saxicole	-0,974	0,226
Sols altérés par l'érosion	0,929	0,370
Mosaïques de cultures et jachères	-0,841	0,540
Forêt claire et savane boisée	0,764	0,645
Savane arborée et arbustive	0,263	-0,965

Source : Analyse factorielle des aires d'unité d'occupation après traitement d'image

Tableau V : Matrice des corrélations reproduites après analyses factorielles des aires d'unités d'occupation de 1990 à 2010

		Forêt claire et savane boisée	Sols dénudés	Marécages
Corrélation reproduite	Forêt claire et savane boisée	1[a]	-0,714	0,861
	Sols dénudés	-0,714	1[a]	-0,971
	Marécages	0,861	-0,971	1[a]
	Sols altérés par l'érosion	0,948	-0,900	0,978
	Savane arborée et arbustive	-0,422	-0,333	0,098
	Savane herbeuse et saxicole	-0,599	0,988	-0,923
	Mosaïques de cultures et jachères	-0,294	0,879	-0,739

a. Qualité de représentation reproduite

Source : Analyse factorielle des aires d'unité d'occupation après traitement d'image

Tableau V (suite 1) : Matrice des corrélations reproduites d'analyse factorielle des aires d'unités d'occupation de 1990 à 2010

		Mosaïques de cultures et jachères
Corrélation reproduite	Forêt claire et savane boisée	-0,294[a]
	Sols dénudés	0,879
	Marécages	-0,739
	Sols altérés par l'érosion	-0,582
	Savane arborée et arbustive	-0,742
	Savane herbeuse et saxicole	0,942
	Mosaïques de cultures et jachères	1

Source : Analyse factorielle des aires d'unité d'occupation après traitement d'image

Tableau V (suite 2) : Matrice des corrélations reproduites d'analyse factorielle des aires d'unités d'occupation de 1990 à 2010

		Sols altérés par l'érosion	Savane arborée et arbustive	Savane herbeuse et saxicole
Corrélation reproduite	Forêt claire et savane boisée	0,948[a]	-0,422	-0,599
	Sols dénudés	-0,900	-0,333[a]	0,988
	Marécages	0,978	0,098	-0,923[a]
	Sols altérés par l'érosion	1	-0,113	-0,822
	Savane arborée et arbustive	-0,113	1	-0,474
	Savane herbeuse et saxicole	-0,822	-0,474	1
	Mosaïques de cultures et jachères	-0,582	-0,742	0,942

a. Qualité de représentation reproduite

Source : Analyse factorielle des aires d'unité d'occupation après traitement d'image

Tableau VI : Matrice des composantes après rotation d'analyse factorielle des aires d'unités d'occupation de 1990 à 2010

	Composante	
	Axe 1 (abscisses)	Axe 2 (ordonnés)
Sols altérés par l'érosion	0,997	-0,073
Forêt claire et savane boisée	0,969	0,247
Marécages	0,960	-0,280
Sols dénudés	-0,865	0,501
Savane herbeuse et saxicole	-0,778	0,628
Savane arborée et arbustive	-0,185	-0,983
Mosaïques de cultures et jachères	-0,521	0,854

Source : Analyse factorielle des aires d'unité d'occupation après traitement d'image
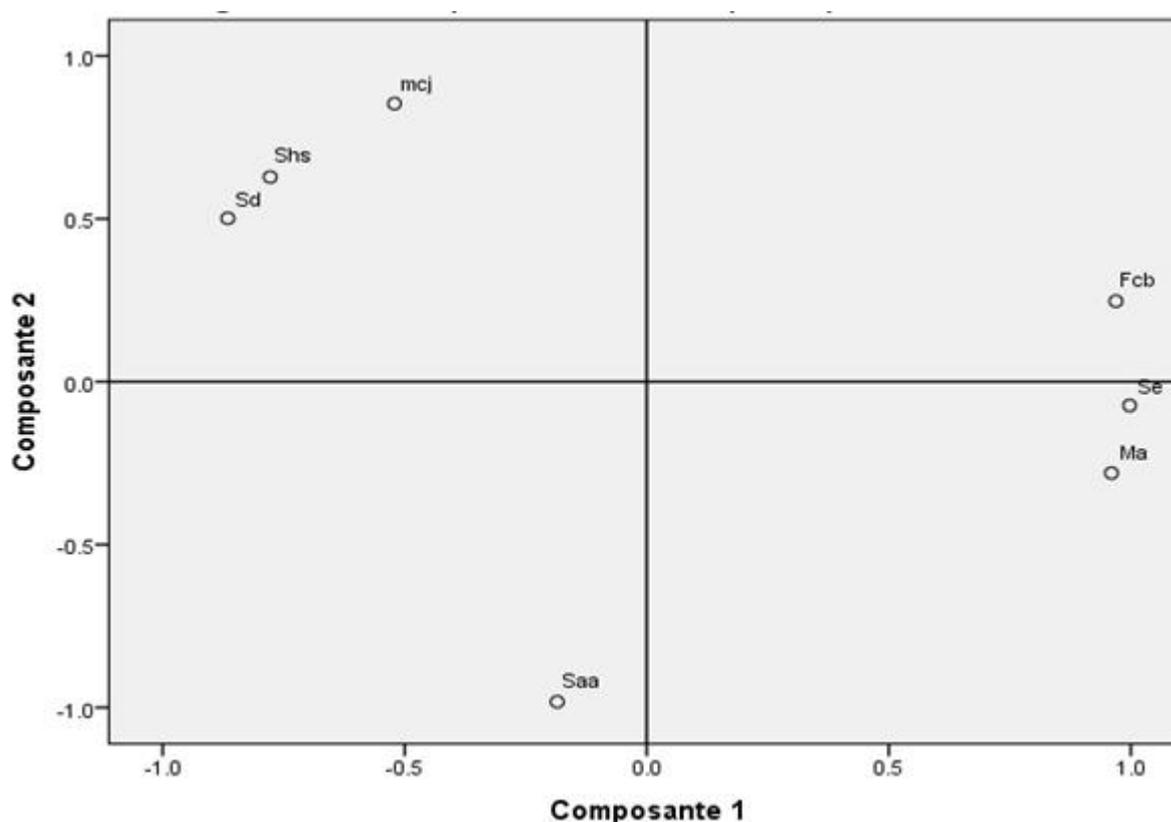
Figure 7 : Diagramme dans l'espace après rotation des composantes principales des unités d'occupation de 1990 à 2010

Source : Analyse factorielle des aires d'unité d'occupation après traitement d'image

Légende : Saa = Savane arborée et arbustive ; Ma = Marécages ; Se = Sols altérés par l'érosion ; Sd = Sols dénudés ; Fcb = Forêt claire et savane boisée ; Savane herbeuse et saxicole = Shs ; mcj = Mosaïques de cultures et jachères.

Discussion des résultats

La matrice de corrélation des aires d'unités d'occupation de 1990 à 2010 révèle qu'il existe une corrélation négative entre les sols dénudés et les formations végétales du massif de Zouzounkan (-0,74 pour les forêts claires et savanes boisées et -0,33 pour les savanes arborées et arbustives). Les mosaïques de cultures et jachères induisent une corrélation négative de -0,29 avec les forêts claires et savanes boisées. L'érosion des sols entraine à son tour une corrélation négative de -0,11 avec les savanes arborées et arbustives. 2 axes factoriels (axe 1 et axe 2) estiment 100% des variances d'analyse factorielle. L'axe 1

représenté par la composante 1 dans la matrice des composantes au tableau 4, estime 73,42 % de cette variance et représente au mieux les sols dénudés (0,997), les marécages (0,986), les savanes herbeuses et saxicoles (-0,841), les sols érodés (0,929), les mosaïques de cultures et jachères (-0,841) et les forêts claires et savanes boisées (0,764). L'axe 2, représenté par la composante 2 détient 26,58% de la variance totale exprimée et représente au mieux les savanes arborées et arbustives (-0,965). L'axe factoriel 1 est se matérialise par une fonction linéaire f(x) = 0,997 Se + 0,969 FcSb + 0,960 Ma - 0,865 Sd - 0,778 Shs - 0,521 Mcj ; où Se = Sols altérés par l'érosion ; FcSb = Forêt claire et savane boisée ; Ma = Marécages ; Sd = Sols dénudés ; Shs = Savane herbeuse et saxicole. L'axe factoriel 2 est matérialisé par F(x) = 0,24 FcSb -0,983 Saa + 0,854 Mcj avec Saa = Savane arborée et arbustive. Du diagramme des composantes dans l'espace après rotation, on déduit que les mosaïques de cultures et jachères et le dénuement des sols constituent des facteurs régressifs et de dégradation des forêts claires et savanes boisées. En effet, l'augmentation de 0,865 unités des Sols dénudés ou de 0,521unités des mosaïques de cultures et jachères entraine une dégradation de 0,969 unités des forêts claires et savanes boisées.

Conclusion

La présente étude a permis non seulement de traiter les images satellitaires LANDSAT du massif de Zouzounkan et de les décoder , mais aussi de comprendre la dynamique spatiale et temporelle des unités d'occupations, de même que leurs contraintes sur le paysage grâce aux analyses factorielles. Il ressort de cette investigation spatiale que la dégradation des forêts claires et savanes boisées est liées aux pressions anthropiques par déboisement intense (ce qui entraine le dénuement des sols), et à l'intensification des mosaïques de cultures et jachères. Il urge des mesures de reboisement, d'aménagement, et de gestion des ressources forestières en vue d'une bonne préservation des écosystèmes pour le bien-être des générations présentes et futures.

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Supply Chain Management: Enabler to Business Advantage

Abhinav Srivastava

MBA Integrated Student, VIT Business School,
VIT University, Chennai, India

ABSTRACT: Adversarial relationships have long dominated business relationships, but Supply Chain Management (SCM) entails a new perspective. SCM requires a movement away from arms-length relationships toward partnership style relations. SCM involves integration, co-ordination and collaboration across organisations and throughout the supply chain. It means that SCM requires internal (intraorganisational) and external (interorganisational) integration. This paper analyses the relationship between internal and external integration processes, their effect on firms' performance and their contribution to the achievement of a competitive advantage. Performance improvements are analysed through costs, stock out and lead time reductions. And, the achievement of a better competitive position is measured by comparing the firm's performance with its competitors' performance.

KEYWORDS: Competitive advantage, Internal and external integration, Logistics integration processes, Logistics performance, Supply Chain Management.

1 INTRODUCTION

Supply chain management (SCM) involves not only the integration of key business processes within the organization but also the integration of these processes throughout the entire supply chain (Croxton, Garcia-Dastugue, Lambert, & Rogers, 2001). "Leading-edge companies have realized that the real competition is not company against company, but rather supply chain against supply chain" (Cooper, Lambert, & Pagh, 1997: 3). Given this approach to organizational success and competition, SCM may present a key opportunity for organizations to enhance performance and establish a competitive advantage. This thesis used the definition of SCM as defined by the Global Supply Chain Forum (GSCF). "The GSCF, a group of non-competing firms and a team of academic researchers, has been meeting regularly since 1992 with the objective to improve the theory and practice of SCM" (Lambert, 2008: 2). According to the GSCF, "supply chain management is the integration of key business processes from end user through original suppliers that provide products, services, and information that add value for the customers and other stakeholders" (Lambert, Cooper, & Pagh, 1998: 1). The GSCF defines eight key SCM business processes. Fully implementing each of the eight processes at once may prove to be difficult and challenging but, may also be necessary in an attempt to avoid sub-optimization (Lambert, Garcia-Dastugue, & Croxton, 2005). This research will delve deeper into the implications of implementing three of the eight processes. Determining the potential impacts of implementing any one or all of the eight processes may prove to serve great value to the field of SCM by further developing a way ahead for SCM implementation. The customer relationship management (CRM), order fulfilment (OF), and returns management (RM) process share distinct relationships and may be able to enhance organizational performance when implemented individually or together. Measuring competitive advantage and organizational performance associated with the development of these processes is a necessary component and step toward capturing the potential benefits SCM may have on the organization

Lambert lists and briefly describes each of the supply chain management processes:

- **Customer Relationship Management –** provides the structure for how relationships with customers are developed and maintained. Cross-functional customer teams tailor product and service agreements to meet the needs of key accounts, and segments of the other customers.
- **Customer Service Management –** provides the firm's face to the customer, a single source of customer information, and the key point of contact for administering the product service agreements.
- **Demand Management –** provides the structure for balancing the customers' requirements with supply chain capabilities, including reducing demand variability and increasing supply chain flexibility.
- **Order Fulfilment –** includes all activities necessary to define customer requirements, design a network, and enable the firm to meet customer requests while minimizing the total delivered cost.
- **Manufacturing Flow Management –** includes all activities necessary to obtain, implement and manage manufacturing flexibility and move products through the plants in the supply chain.
- **Supplier Relationship Management –** provides the structure for how relationships with suppliers are developed and maintained. Cross-functional teams tailor product and service agreements with key suppliers.
- **Product Development and Commercialization –** provides the structure for developing and bringing to market products jointly with customers and suppliers
- **Returns Management –** includes all activities related to returns, reverse logistics, gate keeping, and avoidance (Lambert, Garcia-Dastugue, & Croxton, 2005: 28).

Each of the key processes has sub-processes at the strategic and operational level that are inherent to that process, but these sub-processes are also where interfaces amongst the key processes occur (Croxton et al., 2001). Analysis of these interfaces can lead to an evaluation of the level and strength of the relationships between the key processes. The strategic level is primarily focused on establishing, managing and providing implementation guidance for the process as opposed to the operational level, which "is the actualization of the process once it has been established" (Croxton et al., 2001: 15).

While the GSCF has developed and defined eight key business processes to be developed and implemented within and throughout the supply chain, this research will specifically focus on the extent to which the strategic development of the CRM, OF, and RM processes impact competitive advantage and organizational performance. With a growing level of theoretical and practical importance, SCM has proven to be a pillar in today's competitive global market and this research will provide a clearer understanding of how specific processes comprising SCM contribute to organizations in pursuit of establishing a competitive edge and enhancing performance.

2 INFORMATION TECHNOLOGY

Supply Chain Management is a broad based function which encompasses all business and operational processes involved in but not limited to Procurement, Manufacturing, and Finished Goods Transportation, warehousing & Distribution and Inventory Management. In a globalized business scenario characterized by Geographically spread markets, raw material procurement sources across the world and cheaper manufacturing and labour markets being available in developing world, the business of meeting demand with supply is constantly changing and evolving. Global business has been fuelled and enabled by the IT Technology which has redefined all aspects of business today. All businesses today are run on ERP - Enterprise Resource Planning which provides the organizations with tools to manage all the functions including procurement, production, sales and finance management in seamless and integrated manner.

These software systems like SAP, Oracle, People soft etc, have taken over and enhanced the business processes which were traditionally being managed manually. Demand planning, Forecasting, Global procurement management are some of the enabling tools on which the Global procurement strategies are built and managed. The availability of these sophisticated systems has further enabled companies to implement good and cost effective manufacturing practices like JIT, Kanban, and VMI etc.

Finished goods distribution, transportation and inventory management, besides sales process is again driven by the various ERP modules combined with additional specific applications as required.ERP has enabled companies to manage their business processes in different markets and countries under one common business process thus providing standardization and control. The complex network of various processes, software platforms and applications and different soft ware tools used by various vendors and agents in the entire chain drive the supply chain of the companies.

E commerce has further redefined the way business is carried on. Online purchase has impacted the way supply chains are organized and markets are driven. Customer behaviour and preferences are changing as online marketing is establishing

a one to one contact with the customer and is able to offer a personalized experience. The instant delivery of the information through internet elicits immediate response and action from the customer. The sales lead time is rapidly decreasing. The demanding customer therefore needs to be serviced immediately at the same speed. The internet technology has further opened up the geographical boundaries for the companies. Any person sitting in any corner of the globe is able to purchase a product online at the click of a button. The companies have to be well equipped with the logistics and supply chain network to be able to service the customer.

When in a global scenario, goods and services move through multiple chains involving very many agents including transporters, forwarders, customs, distribution centres, distributors and lastly the retail outlets, availability of data, documentation and information becomes the lifeline for the organization to be able to take decisions and ensure seamless processes and control the supply chain. IT is one of the most important enabler of the Supply chain in modern complex world of Global Businesses.

3 LOGISTICS

Supply chain Management encompasses, planning, design, control and implementation of all business processes related to procurement, manufacturing, distribution and sales order fulfilment functions of a business. All these activities involve multiple networks of vendors and service providers which are integrated and co-coordinated by the Supply chain Experts of the organization to move raw materials and finished goods from and to all distant locations across the globe. Logistics is the backbone on which Supply Chains are driven. Logistics refers to management of flow of goods and supplies involving information, data and documentation between two entities or points. Logistics play important role in post procurement function of delivery of raw material from the supplier to the point of production and Finished Goods Supply chain management from the point of dispatch from factory to the point of delivery to the customer.

The flow of goods flows through a network of transportation by road, rail, air or ship and intermediary warehouses to hold inventories before moving to the forward locations. The entire activity involves multi tier suppliers, agents and agencies including freight forwarders, packers, customs department, distributors and Logistics service providers etc. Logistics therefore is an integral component of Supply chain Management. Origin of Logistics as a recognized discipline is generally attributed to military and defence organizations. Defence departments make use of detailed and extensive planning to gather supplies and move men and materials to various locations and bases. The success of any military exercise depends upon the ability of the establishment to be able to gather information, analyze, assimilate and take appropriate logistical measures to continuously support their units. Similarly in any business organization, the successful operations depend upon visibility and control over the logistics process managed through and with excellent logistics service provider backbone and network. In many cases Supply chain is often referred to as Logistics and vice e versa. Though logistics and supply chain are intricately linked, both do not mean the same. Logistics is a sub component and extension of Supply Chain.

In the case of Finished Goods distribution, SCM strategy will define overall network design for stock holding and further channels of distribution. Logistics deals with the entire gamut of designing transportation network, partnering with 3rd party logistics providers to establish distribution centres and warehouses, planning inventory management and operations process including packing, promotional bundling etc, primary, secondary distribution network and vendors and at the end the complete documentation and information process for the entire chain of activities

4 VENDOR MANAGED INVENTORY

VMI involves a collaborative and continuous inventory supply owned, managed and replenished by the Manufacturer right up to the last stocking point or point of sale to end customer. VMI concept is widely being used by companies both as procurement business model and FG supply chain model too. Industries like retail supermarkets, consumable supplier industry, electronic hardware industry and Automotive Components industries have adopted these strategies effectively to improve their supply chain efficiencies. VMI concept aims to reduce inventory in the pipeline, besides achieving the concept of JIT - Just in time where in the ownership of the inventory lies with the supplier until the time of usage or sale where it gets transferred to the buyer. This model also reduces operational costs of logistics and inventory management for the buyer.

VMI's success depends upon several factors. First of the entire concept pre determines the existence of a strategic partnership and alliance between the supplier and the distributor as well as the logistics service partners. On the part of the supplier, an participative approach to grow the relationship by investing into enhancing value for the customer and extending customer relationship management initiative drives such an approach, where in the supplier agrees to own the inventory

until the point of call off and continues to monitor and manage the inventory besides ensuring replenishments. The customer being distributor or manufacturing plant in this case appreciates the supplier initiative and take interest in coordinating and cooperating with supplier and supervise at times the 3PL who is situated at his premise or at a nearby location.

A VMI model as practiced in retail supermarkets is similar conceptually to the model as in Manufacturing setup, but the role of 3PL would not be as important or relevant it may not call for huge inventory management operations to be setup at the retail store. Though the purchasing and consumption decisions are taken by the buyer and accordingly trigger for stock release takes place from VMI bins, the supplier actively monitors the inventory usage and operates replenishment cycle, plans the shipment modes, delivery and takes ownership to ensuring agreed inventory fill rates and service performance.

5   DOCUMENTATION

Supply chain operations and network extend beyond domestic boundaries and global boundaries of all countries. A logistical exercise originates at the buyers end and involves multiple agencies including buyer, seller, 3PL freight forwarder, transporters at various juncture, shipping lines, airlines, various governmental agencies, customs departments at various locations and financial institutions like banks to complete the entire supply chain cycle. Smooth flowing of materials in a journey originating at one point and going through the entire cycle of exports and imports to reach a point of consumption would mean engagement and interaction with all of the above agencies who have a stake in the said transaction. Need for decision making concerning financial, commercial, technical, operational matters pertaining to shipments arise at various times in the cycle, which demands that the 3PL, the logistics carrier, the buyer, the supplier are actively engaged and have visibility to information and documentation for the smooth flow across various transit points. In fact in faultless logistics operations the documentation and information flow should precede physical movement of goods.

Documentation becomes important not only for the physical logistics operations involving multiple agencies engaged in the entire chain, the financial, trading and accounting processes of the both buyer and seller organizations and partner banks involved also depend upon the entire set of documentation pertaining to each transaction to be able to recognize the sale, recognize value of consignment and effect necessary payment. Accounting practices of the organizations require detailed documentation as per book keeping practices and norms. Finally goods and services are recognized and identified at every stage only with the set of authenticated documentation showing ownership based on which the customs allow them to be exported or imported into or out of the country. There are many more aspects like terms of carriage by the carrier coupled with insurance liabilities and coverage which call for set of documentation covering specific aspects of each transaction. Therefore the entire supply chain transaction involves set of standardized documentation from buyer and seller, from 3PL carriers and documentation as required by customs at exporting country and importing country coupled with trading or bank requirements documents. The entire set of documents and the terms of trade have been developed and standardized across all countries to facilitate international trade.

INCO terms and EDI approved / enabled standardized documentation has made Export and Imports smoother and hassle free, thus cutting down on bottlenecks and delays arising out of documentation requirements. Today software applications have built in standardized documentation templates and modules in their offerings which reduce the amount of time and effort involved in preparing documentation. ERP modules contain the documentation formats as an integral part of its internal processes. 3PL logistics providers work with various software applications which have shipping documentation built into its operational processes and offer track and trace with documentation visibility to customers on the web. Filing documents with customs has been EDI enabled. Electronic documentation has become a part of operations amongst all agencies. However at customs and banking counters, original documents are required to be produced as negotiating and legal valid documents for shipments to be cleared through.

A supply chain manager needs to be aware of the complete set of documentation requirement along with the various aspects to be able to design processes and documentation control mechanisms. Errors in documentation will lead to financial damage, delays in delivery and performance which is what every manager aims to avoid.

6   WAREHOUSE MANAGEMENT SYSTEM:

In any Supply Chain, Inventory Management and Warehousing form a part of operations intensive function and is one of the key building blocks in the entire chain. Most of the inventory is held at the warehouses as compared to the pipeline, and the efficiency of the warehouse operations will determine the further supply chain efficiency. Though it is a normal industry practice now to outsource the warehousing operations to a 3PL Logistics service provider, the SCM managers who are the decision makers and network owners would need to know the intricacies of warehouse operations and get actively involved

in choosing the right partner and right facility. A distribution centre or a warehouse is the key to the entire model as it holds the inventories and also manages other operations like bundling, packing, labelling, co packing, kitting etc as per buyer requirement. Most of the marketing and buyers requirements are met with from the warehouses.

Many factors and elements contribute to successful operations of a distribution centre. The time taken to detail the project and build a model taking into account all considerations will go a long way in ensuring operational efficiency of the supply chain.

6.1   PHYSICAL INFRASTRUCTURE

The building blocks or operational criteria of an ideal Warehouse Management System includes location, structure, roof height and flooring, design and layout external, utilities and facilities in the premise, internal layout design, storage infrastructure, material handling equipments, lighting and safety equipments and mechanisms, office infrastructure, IT and communications infrastructure, power and backup services and finally accessibility of the location and availability of labour. The list can be exhaustive and depends upon specific needs of each buyer's business.

6.2   IT SYSTEMS

The efficiency of warehousing operations is highly dependent not only upon the physical infrastructure but the system and intelligence that controls, directs and manages the physical transactions. A robust WMS capable of managing inventory and locations which is RF driven or enabled, would be the backbone of a good efficient warehouse.

The Warehouse Management System controls two sets of operations:

- On the inventory front, the system maintains inventory in the warehouse at Zone & individual location level, SKU level, pallet wise, carton wise and unit level inventories for multiple customers and allows specific inventory attributes and parameters to be built in to manage, allocate or block the inventory. The system also provides options to adapt FIFO, LIFO or other methods of inventory flow.
- On the Operations front the system manages, controls and directs all operations including receiving processes, put away processes, order processing, inventory allocation, picking process, packing process and finally shipment along with inventory updating. The intelligent system guides and helps operations manager to schedule and manage all operations for various groups and teams simultaneously depending upon the work load and pattern and thereby manage resource allocation too.

Another critical function of WMS is the cycle count process which is required to maintain the health of the inventory. WMS initiates daily cycle count and wall to wall counts as per user specification and attributes. Lastly WMS is able to provide various types and categories of reports and information related to inventory, shipments, transactions, timings of transactions and many more parameters.

7   CONCLUSION

A supply chain is the network of relationships between the upstream and downstream activities with all stakeholders who are involved in this chain of relationships. To take an example, if a particular good or service has to be delivered to the customer, there are raw materials that are needed for the manufacture, the forms of transport and means of storage for the raw materials, the transport of the finished goods to the retailers and the logistics involved in getting the goods to the customer are all parts of the supply chain that extend from the suppliers to the customers. In other words, there is a chain of relationships between the firm and the partners involved in this chain. Therefore, supply chains are comprised of all these stakeholders and the relationships between them determine the effectiveness of the supply chain. In contemporary times, supply chains can be sources of competitive advantage as efficient management of the supply chain leads to cost savings and synergies between the components of the supply chain leads to greater profitability for the firms. It is for this reason that many business leaders have focused their energies on optimizing the supply chains for increasing the top line as well as the bottom line.

In times of economic recessions, supply chains can be used as strategic levers as they can be optimized to perform better than the rivals do so that more profits can be extracted and lesser costs incurred. The optimization of the supply chain through just in time or JIT methods of holding inventory, focus on reducing the COGS or the Cost of Goods Sold by rationalizing the expenditure on the components of the supply chain all lead to a situation that can be extremely beneficial to the firms. It is for this reason that many firms like Wal-Mart, Proctor and Gamble, Tata Motors, and Unilever has focused on

rationalizing the activities that form the supply chain. The point here is that with astute management of the supply chain, the firms can derive value from the process, which can then translate into greater profits and lesser costs. Apart from this, the supply chains can also be of strategic and competitive advantage because a major portion of the cost of goods sold or COGS is made up of the logistics and the supply chain expenses.

Finally, the twin challenges of the globalization of the world economy and the increase in the global complexity of supply chains are formidable and when taken together with the effect of the ongoing economic crisis, business leaders have their hands full trying to make decisions on how to meet these challenges.

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Development and Effectiveness of Social Adjustment Scale for Urban Adolescence

[1]**Dhanajay Joshi and** [2]**Indrajeet Dutta**

[1]University School of Education
Guru Gobind Singh Indraprastha University
New Delhi, India

[2]Research Scholar
University School of Education
Guru Gobind Singh Indraprastha University
New Delhi, India

ABSTRACT: Adolescence is a phase of the life which is generally can be considered as "re-birth" as many physiological, emotional, cognitive changes takes place. It is the phase of a life where there is a change in the personality of an individual takes place. Erikson and Marcia have considered this phase as identity formation or confusion phase. According to Piaget, there is spurt in the cognitive development of individual at this age. Moreover, it is also the phase wherein individual is under the influence of peer group rather than the parents or elders. Therefore, an individual is always faced with conflict and struggle related to needs and satisfaction especially with his social environment. An individual has to reconcile with his conflict and struggle and thus maintain equilibrium which is generally called adjustment. Though, there are several areas of adjustment like school, home, emotional, educational and personal but, most important is the social adjustment of adolescence especially in light of the present contemporary society. The investigator self-designed and standardized the social adjustment scale on the urban population in the age group of 13-17 years. Thereafter, tool was administered to 246 students taken from heterogeneous schools. The number of male and female participated in the study was 131 and 115. The result obtained was that majority of the male and female fall in the moderate category of social adjustment. Moreover, there was no significant difference between the female and male students on social adjustment.

KEYWORDS: Adjustment, Social adjustment, adolescence, students, gender.

1 BACKGROUND

Man is a social being surrounded by numerous problems which are proclaimed daily, in living colour and in a best-selling literature of turmoil, alienation and despair challenging his adjustment. Adjustment is as old as human race on earth. The history of adjustment actually begins with early man's awareness of the extremely deviant and disturbed individual. The concept of adjustment originated in biology and has been derived from Darwin's theory of evolution in the mid eighteenth century which was later on borrowed by the psychologists and renewed which is considered as an index of integration between needs and satisfaction and its related to achievement, social acceptance, age, sex, economic security and moral standards [17]. Darwin (1859) in his theory of evolution says, *"Life presents a continuous chain of struggle for existence and survivals"*[9]. Darwin used the term as adaptation strictly for physical demands of the environment but psychologists use the term adjustment for varying conditions of social of interpersonal relations in the society. Attainment of goal or satisfaction of needs and thus arriving at a balanced state between his needs and satisfaction is often termed as adjustment. Adjustment is often used as synonym for accommodation and adaptation. Strictly speaking, term denotes the results of equilibrium, which may be effect by either of these processes. It used to emphasis the individual struggle to survive in his or her social and physical environment. The word adjustment is commonly mean to fit, make suitable, adapt, arrange, modify and harmonize. When we

make an adjustment between two things, we adapt or modify one or both of them to correspond to each other. In some situations, one of the factor may not be changeable and so one which is has to be modified in some way to suit the other. The term adjustment can be defined as the process of finding and adapting modes of behaviour suitable to the environment or to change the environment. The adjustment means reactions to the demands and pressures of social environment imposed upon the individual. The demands may be external (social and educational) or internal (emotional) to which the individual has to react. These two types of demands sometimes clash with each other and consequently make the adjustment a complicated process for the individual. Individual needs differ from person to person and from time to time. Accordingly he adjusts himself in the immediate environment to meet his needs. Needs of the adolescents are multidimensional, they will have good adjustment in all the aspects of their life if there is balance between their intellectual, emotional, social and other needs and their satisfaction. This leads to lack of control over emotions and it results in emotional instability. Adjustment consists of two types of processes. The first one is fitting oneself into given circumstances and the second one is changing circumstances to fit one's needs. Hence adjustment is important in one's life. Adjustment during the period of adolescence will determine to a large extent what he or she will as a person as an adult. An individual is said to be adjusted in environment if there is harmony among this needs that are attainable. The other thing is that these goals should be socially desirable. So, it is the harmony of the internal with the external. The extension of a ladder by a suitable length to reach an upper story window is a good example of such an adjustment. Wearing of clothes according to the requirements of the season is another such example as ordinarily, it is beyond our capacity to change the season according to our clothes. As an individual, person adapts to physical demands, he also adapt to social pressures i.e. to demands that arise living interdependently with other person. Adjustment means behavioural reaction to personal demands and social pressures. Good adjustment is essential so that an individual grows fully and also contributes to society. A maladjustment parson has frustrations, conflicts and is not able to lead contended lire. This is a common experience that a physical healthy person is less susceptible to disease than a physically weak one. Similarly a well-adjusted person is better able to withstand psychological stress and social pressures than one who is maladjusted. A well-adjusted person possesses good mental health and hence able to maintain a balance between his biological, psychological and social needs.

Social adjustment is the process whereby the individual attempts to maintain of further his security, comforts, status of creative in calcinations in the face of the ever changing conditions. It means bringing about changes in the habitual conduct or behaviour which necessary of an individual as a social is being (Warren, 1934). As pointed by the Adler " a socially well-adjusted person is not only efficient and happy in his environment but also he must have a sense of social feeling, i.e. he must be cooperative and sympathetic"[7]. It therefore, includes adjustment to the family his circle of friends being and cannot be with himself without the society in which he is bor. A socially well-adjusted person is capable of establishing satisfactory contacts with others and feels comfortable in the presence of other. His outlook on life is so socially oriented rather than self-seeking in nature. In a modern society there is a general tendency to desire high social position. It has been pointed out by psychologists that people who get adequate satisfaction out of their position in society tend to be adaptable and superior in social adjustment. Good social adjustment is important at every stage of human development, but it is special significance lines lies during adolescence period. Social adjustment further implies social responsibilities as well as senses of duty towards the fellow men and the willingness to contribution to social welfare. Good social adjustment therefore signifies that the individual is able to adjust easily to people in other words it implies that one is likeable self-confident and effective in social relationships. Good social adjustment is important at even stage of human development but its special significance lies. Social adjustment is the degree to which the child has developed a harmonious relationship by adapting herself/himself into the social environment. Most of the scales related to adjustment were made on overall adjustment rather than areas like educational, home, school, emotional, social of children. Since, social adjustment is an essential aspect of adjustment and the children of the rural or urban background in the range of 13-17 years are now reporting more of social adjustment problem. Therefore, the study was done to (i) develop social adjustment scale and thus (ii) find out the level of social adjustment especially of the children in the age group of 13-17 years. (iii) Further it was examined whether there is a difference in the social adjustment of female and male children.

2 METHOD

2.1 Participants

Delhi as an educational centre had schools run by different management ranging from purely government to entirely private. Even within government there are several classifications like central government, state government, semi-government, schools run by local bodies, defence welfare society etc. As a result a heterogeneous population generally studies in these schools. Delhi is divided educationally in nine districts and multistage random sampling technique was adopted to select schools giving adequate representation to all types of school. The sample consisted of 457 students in the first phase of tool development and 246 students in the second phase. In the first phase out of 457 students 215 were females and 242 were

males with age ranging from 13-17 years (M=15.2 and S.D 0.75) whereas in second phase out of the total students of 246 students 115 were females and 131 were males with age ranging from 14-16 years(M= 14.9 and S.D=0.62). As the purpose was to develop the social adjustment scale for children normative survey method was adopted by the investigator.

2.2   Procedures

2.2.1 Construction of Scale

2.2.1.1 Technique Adopted: There is always a controversy exists over the relative merits of different models in summated scale construction. The procedure of summated ratings described by Likert (1932) is probably the most influential and frequently employed method. This is due mainly to the relative simplicity of the technique involved and the comparative case in administering scoring the Likert type scales. More significantly, studies which have compared the Likert procedure with alternatives as Guttman scale, Thurstone scale, the semantic differential scale have consistently shown that attitude measures developed by the Likert procedure is more reliable and functions more effective as predictor of behaviour [1],[8], [3],[12]. For developing the present 'scale' thus the standard procedures and statistical techniques suggested by Edwards for the summated method was used. The social adjustment scale Social Adjustment Scale (SAS) is designed as a five point Likert type forcing assessing the social adjustment of the subjects. The SAS is self-administering if the examinee fully understands directions. It can be administered individually or in a group setting. The procedure for construction of the scale is described under the following headings:

2.2.2.2Planning of the Scale: The research scholar reviews the literature on the procedure of developing a tool. Thereafter, he looks at some of the tools being developed including the ones which he was using in the study by going through their manual. Even he consulted few esteemed people in the field who had the experience of developing a tool. Thereafter, extensive review of the documents and researches available on the concept of social adjustment was undertaken especially to operationally define it. For this researcher looks into the books, dictionary of psychology encyclopaedia, journals, articles based on social adjustment, various tools developed on adjustment specially Bell's Adjustment Inventory(BAI) and tried to find out how the other researchers (outside India), had defined it? Based on the definitions available on social adjustment, researcher in consultation with experts operationally defined the term for the study. Since the study was in relation to parenting style, after acquiring the expert's opinion a list of factors were sorted out which influence social adjustment. The items were constructed based on the identified factors that influence the social adjustment of the children in his day to day life. Therefore, the factors which affect the social adjustment of secondary students are: Parents, siblings, peer group, teachers, school environment, classroom environment, social gatherings, and neighbours.

2.2.2.3The Item Pool: After taking the decision about the technique of scale construction the investigator constructed the items. The initial pool of items gathered by referring to the standard literature on the subject.The statements for the items were obtained from existing tools on adjustment especially Bell's Adjustment Inventory along with various research papers, editorials, books and other material that dealt with area. All together 123 items were constructed covering all the factors.The precautions based on the informal criteria suggested by various experts were taken in to consideration while preparing and while editing the statements [10],[4],[2],[19],[18]. These are:

- The statements which referred to the past rather than the present were avoided.
- Factual statement or capable of being interpreted as factual were not included.
- The statement irrelevant to the psychological object under consideration was not included.
- Such statement were selected which covered the entire range of the affective scale of interest.
- The statements which were likely to be endorsed by almost everyone or by almost none were not included.
- The statements which might be interpreted in more than one way were avoided.
- The language of the statements was kept simple, clear and direct.
- The statements were kept short rarely exceeding twenty words.
- Statements containing universals such as all, always, none/ never were avoided.
- It was seen that each statement contained only one complete thought.
- Statements were in the form of simple sentences rather than complex sentences.
- Uncommon vocabulary which might not be understood was avoided.
- The use of double negatives was avoided.
- Double barrelled statements were discarded.
- Words such as only, just, merely etc., were used with care and moderation in writing statements in each sub scale.

The initial lists of statements were revised many times after a lot of rethinking by the research investigatorspecifically to check the duplication of items, language ambiguity and items are apt in terms of measuring social adjustment or maladjustment.The application of the above mentioned criterion pruned the list to smaller number of statements. After further reviewing the statement it was found out that some items were rejected on the basis of: clarity, grammatical error and some of the statements response were difficult to get.The intention was to keep equal number of positive and negative statements.In order to ascertain the internal consistency of the items and to eventually improve the scale, the draft was sent to 11 judges for their comments.While submitting the scale to experts following questions were also asked? (1)Which of the items are framed in accordance to the operational definition? (2)Which of the items are not in accordance or unreasonable to ask from the students? (3)Which of the statements are positive and negative? (4) What will be the most appropriate options? (5) What will be the scoring pattern of each statement in the scale? The criteria of item acceptance was that if majority of the expertswere in agreement as per the Q.No.1, 2 and 3 asked, it would be accepted as the item worth to be in the scale. Upon their suggestion, number of statements was rejected while others were improved upon. Finally, the list contained 78 statements; divided into positive and negative items. Since majority of the tool available on adjustment were either two-point or three point scale, therefore, researcher in consultation with experts decided for five point rating scale.

2.2.2.4 Pilot Study: At the pilot testing stage the instruments (tests, questionnaires, observation schedules, etc.) are administered to a sample of the kinds of individuals that will be required to respond in the final data collection. The two main purposes of most pilot studies are:

• To assess whether a questionnaire has been designed in a manner that will elicit the required information from the respondents. This process allows weaknesses in the questionnaire to be detected so that they can be removed before the final form is prepared. Typical weaknesses that are found in questionnaires include:

❖ Ambiguities in the phrasing of questions.
❖ Excessive complexity in the language that has been used.
❖ Inappropriate response categories for some questions.
❖ Some questions are redundant.

• To assess whether test items can be understood by the students, that the items are pitched at the appropriate level of complexity, provide a stable measure of student ability (assessed by the 'Reliability Index'), and lead to the construction of total test scores that are meaningful in terms of the student ability being examined (assessed by the 'Validity Index'). Typical weaknesses that are found in tests include:

❖ Some items have either no correct answer or more than one correct answer.
❖ Some distractors in multiple choice items are not functioning.
❖ Some items measure abilities different from the ability measured by other items (assessed by the 'Discrimination Index').
❖ Some items contain internal 'tricks' that result in high ability students performing worse than low ability students.

At the same time that the instruments are subjected to pilot testing, it is desirable to assess the effectiveness of the data collection procedures being used. These procedures include the steps to be followed for ensuring that the correct number of instruments with appropriate identification numbers on them for student. Furthermore, there are procedures for selecting and then administering the questionnaires to the students (all students, one class of students, or a random sub-sample of students within a selected school). These activities address the following important questions: Are any problems evident in the procedures? How can the procedures be improved? The same can be said about the procedures for entering data, cleaning data, and merging files. This work is usually undertaken by the planning office data processing unit, but again the results of the pilot testing experience can help to 'de-bug' the procedures. Once the instruments and procedures have been finalized, the main data collection can begin. A pilot test was carried out. During pilot study the tool was given to sample of 60 students of diverse background from private and government schools of secondary level. Only three items were rejected as students have objection related to it. In two or three items students have difficult in understanding the words which were modified.

2.2.2.5 The Try-out: The draft with 75 items was administered on standard conditions on a sample of 217 secondary school pupils who were randomly selected. The subjects were chosen randomly from different kinds of school. These schools are from east and south district of Delhi. Necessary instructions for pupils were printed on the scale. The procedure for marking the responses was more clearly explained by giving instructions to the respondents.The first part of the test intended to collect personal information of the people such as name, sex, age, subject, name of school etc. In each statement of the scale the subjects had to decide how far each statement in the scale is true to their case and it provides a measure of the adjustment they possess. As per the instructions the pupils were required to respond on a five responses category namely "All the Time", "Most of the Time", "Sometimes" "Rarely" and "Never". Student was required to put a tick mark (√) on any one of the five

response categories which according to student best reflects their experience or behaviour. The time requires for completing the social adjustment scale ranges an average of 25-30 minutes. The 217 text books thus obtained were scrutinized. Some booklets (15 in number) were incomplete in some respect or the other and as such were discarded. The remaining booklets were reduced for facilitating computations for items analysis.

(v) Scoring Scheme: For scoring the scale a negative item in the scale a score of 5–All the Time, 4-Most of the Time, 3-Sometimes 2-Rarely and 1- Never. Scoring scheme was reversed for the positive items. The weight age assigned for each response category on the position positive and negative items shown in table.

Table 1: Scoring Scheme for Social Adjustment Scale

S.No	Type of Item	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1	Negative	5	4	3	2	1
2	Positive	1	2	3	4	5

A total score for each subject taking the test can be obtained summing the value of each item checked by investigator. Thus, the increase score would indicate higher degree of maladjusted.

2.2.2.6The Item Analysis: Item analysis is the basis for rejecting statements which are inappropriate. As a first step, for each item, the number of pupils making response were found out and presented in the form of a frequency table. The scored items were arranged in a descending order on the basis of the total score.As suggested by Edwards [9] 27% of the subjects with the highest total scores and also 27% of the subjects with the lowest total scores were taken.The scripts of 200 respondents were scored and arranged in ascending order based on the total scores obtained by the respondent 54 scripts getting the highest scores (top 27 per cent) and 54 getting the lowest scores (bottom 27 per cent) were taken from the upper and lower groups.

"We assume that these two groups provide criterion groups in terms of which to evaluate the individual statement"[9].

 These two groups provided the criterion groups for the purpose of item analysis. The scores obtained each item by these two groups were used for calculating the discriminating power of each item. The discriminating power was obtained calculating the 't' values using the formula recommended by Edwards[9]. The value of 't', thus obtained for each statement is a measure to the extent to which it differentiates between the high and low groups.The final 'scale' consisted of items selected on the merit of their values. Those items exceeding a t value equal to 1.96 (.05 level of significance) or above were retained in the final scale.

2.2.2.7SAS: Final Form-The final scale was thus comprised of 60statements out of which 32 are worded positively and 28 are worded negatively.The selected items were rearranged more or less in the positive and negative statements without any perceptible order or pattern. Care was taken to keep related or similar statements at some distance from one another. Thus, emerged the final form of the scale the social adjustment scale-preceded with an introductory note carrying instruction for respondents. The final 'scale' was subjected to statistical treatments in order to establish the norms, the reliability and validity. It was administered to 500 students but on scrutinizing the questionnaire it was found that 457 students had filled and completed it properly.

Table No. 2: Arrangement of Items in the Social Adjustment Scale

S.No.	Type of Items	Location of Items in the Scale	Total Items
1	Positive Items	1,2,4,5,7,9,11,13,15,17,19,21,22,23 25, 27, 29, 31 33,37,39,41,43,45,47,49,51, 53,55,56,57,59	32
2	Negative Items	3,6,8,10,12,14,16,18,20,24,26,28,30,32,34, 35,36,38,40,42,44,46,48,50,52,54,58,60	28
3	**Total Items**		**60**

(vii)TECHNICAL DATA:

 Reliability: Determination of reliability is one of the major and important steps during the construction of any tool. The term reliability has two conditions, first it refers to the extent to which a test is internally consistent that is consistency of results, obtained throughout the test when administered once. It shows how accurately the test is measuring at a particular time. Second, reliability refers to the extent to which tools yields consistent results upon testing and retesting that is called precision. In other words how dependable is it for predictive purposes.

Method of Reliability: For determining the reliability of the SAS, the scores on the odd and the even items were taken separately on a sample of 457 subjects. The product moment co-efficient of correlation was computed between the scores on odd and even items. Split half reliability was computed on a sample of 457 students by applying Spearman Brown Formula. The reliability co-efficient thus obtained was 0.853. In case of Cronbach alpha, the reliability coefficient was found out to be 0.883. The Guttmann split half reliability yields .850.

Table No. 3: Measure of Reliability by Various Methods

S.No	Methods of Estimating Reliability	Sample of Subjects	Number of Items	Value
1	Cronbach's Alpha	457	60	.883
2	Spearman-Brown Coefficient	457	60	.853
3	Guttman Split Half	457	60	.850

Method of Validation: Validity is an important characteristic of a scientific instrument. If refers to the degree to which a test measures what it claims to measure.

Validity: The investigators depended on construct validity as this is often used in attitudinal testing (Edwards 1969). Further proper care was taken at the time of constructing items to maintain validity and by item analysis this was further ensured. The high discriminatory power of items (higher than 1.96 significant at 0.05 level) is a testimony to its internal consistency. The validity of the scale was assessed by finding correlations between the total scale score and the score on each item using the product moment method. Computed values of Pearson 'r' ranged from .168 to .503(correlation coefficient significant at .01 levels).High correlations show that the scales enjoy high validity.

Content Validity: Content validity refers to whether the specified domain of content is actually measured. It addresses the degree to which a measure contains what it ought to contain as a measure of a given construct, which usually means the items on the measures. Content validity is best assessed by subject matter experts or people thought to occupy higher levels of the construct being measured. Content validity is concerned with the relevancy of the contents or the items individually and as a whole. In the present study, as mentioned earlier, all the test items were evaluated by 11 experts. As per their suggestions some of the test items were either modified or dropped. This refers to the high degree of content validity.

Criterion related validity: It refers to how well an empirical measure predicts an outcome event that is external to it, that is how well it predicts a criterion. The concurrent type of criterion related validity evidence is produced when the test and criterion related validity evidence is produced when the test and criterion data are collected at the same time. By contrast, the predictive type of criterion related validity evidence is produced when the criterion data are collected at a later time. In general, this kind of validity is assessed by correlating scores on the empirical measure with scores based on the outcome event.

2.2.2.8Norms of the Scale: The scale was administered to the age group of 13-17 years to both the sexes of different socio-economic background.

Table 4: Comparison between Female and Male Social Adjustment

S.No	Gender	N	Mean	Std. Deviation	df	t
1	Female	215	141.0791	23.58536	455	.684
2	Male	242	140.1612	24.46004		

Table of Interpretation: The raw score obtained after tool was administered to sample of students, was converted to Z-score and corresponding T-score. Thereafter, entire Z –score was converted into five categories based on the point of inflexion of Normal Probability Curve (NPC). These five categories along with range of raw score, Z-score and T-score are presented in the following table:

Table 5: Level of Social Adjustment among the age group of students in the age group of 13-17 years

S.No	Range of Raw Score	Range of Z-score	Range of T-score	Level of Adjustment
1	Less than equal to 92	Above -2 σ	Less than equal to 30	Excellent
2	93-116	-1σ to -2 σ	31-40	High
3	117-164	-1σ to +1σ	41-60	Moderate
4	165-188	+1σ to +2 σ	61 -70	Low
5	Above 188	Above +2 σ	Above 70	Poor

3 RESULTS

The above tool was used to find out the level of social adjustment among adolescents. In regard to the objective related to finding the level of social adjustment among female and male students, the percentage wise analysis was done for the different level of social adjustment.

Table 6: Distribution of Female and Male Students on the Different Level of Social Adjustment

S.No.	Level of Social Adjustment	Gender of Students					
		Female		Male		Total	
		N	%	N	%	N	%
1.	Excellent	4	3.5	3	2.3	7	2.8
2.	High	20	17.4	16	12.2	36	14.6
3.	Moderate	71	61.7	94	71.8	165	67.1
4.	Low	18	15.7	18	13.7	36	14.6
5.	Poor	2	1.7	0	0	2	0.8

The table revealed that 61.7% of female students were in the moderate category of social adjustment whereas 17.4% of female students were in the high category of social adjustment. Only 15.7% of female students were in the low category of social adjustment. Merely 3.5% and 1.7% of female students were in the excellent and poor category of social adjustment. It is further noted from the table that 71.8% of male students were in the moderate category of social adjustment whereas 13.7% were in the low category of social adjustment. Around 12.2% and 2.3% male students were in the high and excellent category of social adjustment. None of the male students were in the poor category of social adjustment. If we compare the percentage of female and male students on social adjustment, what we noticed that in the moderate category of social adjustment, male students (71.8%) had higher percentage than female students (61.7%). But, in case of high category female percentage (17.4%) was higher than the male (12.2%) and so was the case in low category. If we look into overall scenario, almost 67.8% of the total sample of students was in the moderate category of social adjustment whereas equal percentage (14.6%) of students was in high and low category of adjustment. Only, very small fraction of 2.8% of students was in excellent category and 0.8% in poor category of adjustment. This indicates majority of the female and male were having moderate level of social adjustment in his/her environment.
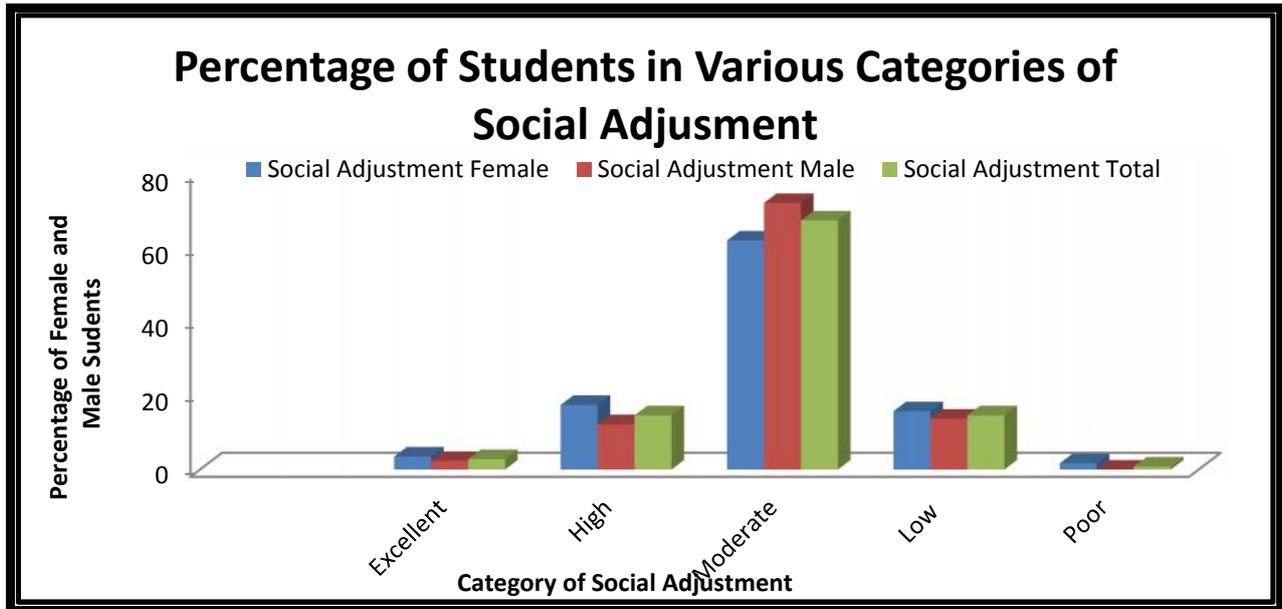
Fig.1 Comparison of Female and Male Students on Social Adjustment

To see whether gender act as determinant for the social adjustment, the mean difference between the female and male students on the variable social adjustment was computed.

Table7: Mean and S.D of Female and Male Students on Social Adjustment

S.No	Gender of Student	N	Mean	SD	t-value
1	Female	115	140.067	25.256	.010
	Male	131	140.038	22.698	

(Significant at .05 levels)

The table 7 shows that the calculated mean score of female students on the social adjustment scale was 140.067. The calculated mean score for male students was 140.038. The standard deviation for both the group was 25.256 and 22.698 respectively. The t-test was applied and calculated t-value comes out to be .010 which was less than the table value at df-244 at .05 level of significance. Hence, female and male students did not differ significantly on social adjustment. Thus the hypothesis **"there is a no significant difference in the social adjustment of female and male students" was accepted.**
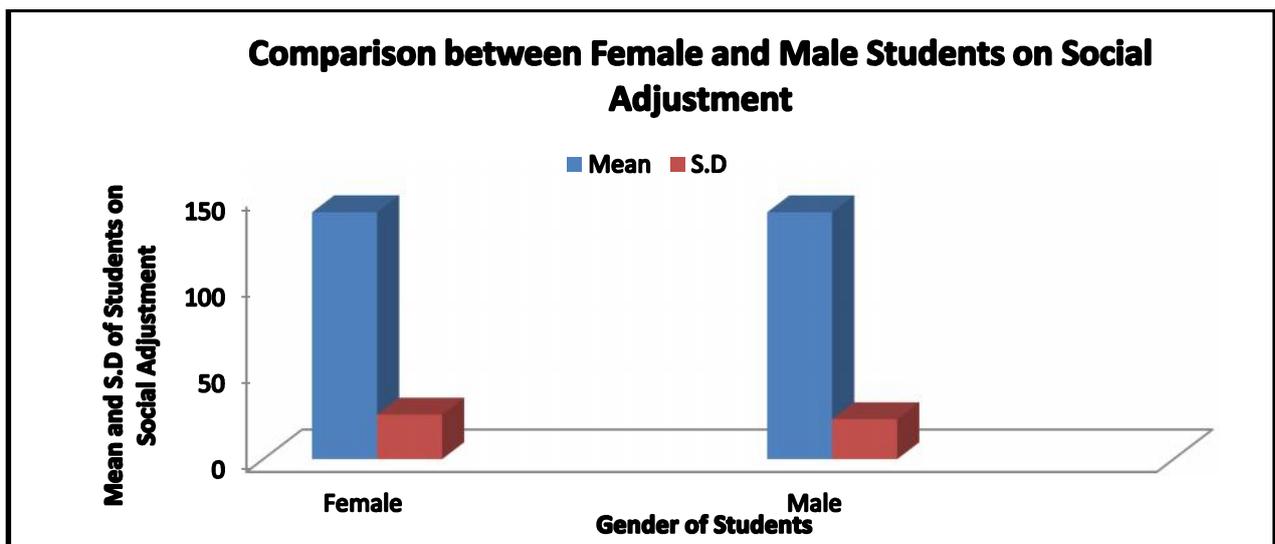

Fig. 2 Mean and S.D of Female and Male Students on Social adjustment Scale

4 DISCUSSIONS-CONCLUSIONS

The result obtained in regard to development of the scale on social adjustment is highly encouraging as it indicates a very high reliable and valid tool. In India there is hardly any tool which exclusively measures social adjustment. The result obtained was quite similar to other studies where social adjustment was average in both the sexes(Talukdar et al).The moderate level or average level of social adjustment of large sample of students has somehow triggered the need that school environment and its factor as well as home environment and its factor have to play a crucial role in moderation when the children are in a position of unbalanced situation and thus tries to reconcile with the needs and satisfaction so that child has better social adjustment in adult life. social adjustment indicates In regard to the gender as a determinant factor for social adjustment, result indicated that there is no significant difference between the female and male students. This is similar results what has been reported in other studies [16],[5],[14],[20]. The major limitation of the study was that data obtained has its base in urban whereas to get real picture related to social adjustment it is necessary that rural part of India and its population should be included to have wider acceptability of the tool.

Social adjustment is one of the crucial areas of adjustment especially in the age group of teen years or pre-adolescence or functionally adolescence. According to the Erikson (1968) it is the period of identity formation wherein child is in constant struggle between self and the outer world. Child wants to break free from the control of parents as well as from the norms of society and thus questions the norms of the home, society etc. On one hand, child wants to idealize himself or herself with the ideal self and on the other hand he faces lot of struggle wherein he idealizes himself with real self. There is a constant struggle between real self and ideal self. Child tries to balance between the two. An individual tries to maintain the equilibrium position in such phase. Sometimes he/she succeeds in doing it and other times it do not. This struggle of child led him/her to either well adjustment in the society otherwise maladjustment. The present social adjustment scale developed by the investigator has able to measure the social adjustment of children. The high value of inter-item and inter-total item correlation along with high reliability and validity indicate it is reliable tool to measure social adjustment. Though, tool has been in wide variety of population but still it needs to be tested in rural set up for wider acceptability.

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OPTIMIZATION OF MEDIATION IN AGRARIAN CONFLICT RESOLUTION IN THE DISTRICT MESUJI IN CONNECTION WITH THE LAW NUMBER 5 1960 REGULATION OF BASIC PRINCIPLES AGRARIAN

Abdan Khubban

Pengadilan Agama Gunung Sugih, Lampung Tengah, Provinsi Lampung- Indonesia

ABSTRACT: Agrarian conflict sticking lately actually comes from access and economic orientation of agrarian policies of the past. This chaotic place since colonial government and continued into the new order until now. The end of 2011, the national media exposes Mesuji case. A case characterized by its outstanding beheading video is torn into a national issue. The government immediately takes action to set up a Joint Fact Finding Team (Fact Finding Team) Mesuji case. Sector legislation concerning the management of resources contributed to the Agrarian enunciator Agrarian conflicts. Birth of various sectoral laws such as the law and the law of plantation forestry, impact on the management of diverse resources primarily agrarian land. The diversity of legal rules also cause disharmony that gave birth to the issue of inequality and deepening agrarian structure which leads to the agrarian conflict. Mediation process to resolve land conflicts between residents and the East Mesuji PT Prima Alumga (PPA), resumed. The company is ready to give some land to the citizens. Mediation meeting chaired by Regent Mesuji Khamamik, attended PPA owner Hepi Trenggono, Lampung Police Operations Bureau Chief Commissioner Sahimin, Tulang Bawang district police chief Assistant Commissioner of Shoebarmen, Head North Rawajitu Edyson Basid, and some community leaders Cambai River Village, East Mesuji. In the mediation meeting, Khamamik provide direction in order to resolve the land conflict mediation was undertaken in good faith and open mutual agreement. In previous meeting PPA agreed to manage his part of the land concession, then the results are given to people Cambai River and River Assembly.

KEYWORDS: Optimization , Mediation , Conflict , Agricultural , Mesuji , Law no. 5 of 1960.

1 INTRODUCTION

Homicides that occurred in Mesuji, Lampung, in September 2011 related to a conflict between the community and the company is a serious problem. Seriously called not only because it has resulted in loss of life, but also because this issue relates to the fate and lives of many people, both local people and the company itself is also overshadow so many people. On the side it is also related to the agrarian problem in Indonesia, which is one of the very many problems that occur in various parts of the country.

In a legal perspective, the land dispute that occurred in Register 45 Mesuji, Lampung had violated the rules contained in Law no 5 of 1960 on Basic Agrarian Regulation. Land managed by the people then evicted by the state company PT Silva. Soils should be enabled to provide maximum benefit for the prosperity and welfare of the people it has occupied for the maximum benefit of capital owners.

Mediation is an alternative comprehensive solution to the conflict between residents with companies that are believed to contribute very positively to the country in its various aspects, social, economic, including security and law enforcement. Optimizing mediation between various parties related to the conflict in Mesuji require maximum effort. Efforts settlement through mediation requires the commitment of many elements in order to provide the most favorable outcome for all parties.

To maximize the mediation process, it takes a solid team and mastering the problem as a whole, in addition to a total commitment on the belief that in this way will be able to give the best results. As part of the process of resolving legal problems especially in a large scale , mediation should be undertaken with a clear framework and targets , including the planning and measurable steps and systematically.

2   AGRARIAN CONFLICT IN MESUJI

Hundreds of farmers return land occupied Register 45 Mesuji, Lampung, on Sunday, December 18, 2011. Beginning of September 2011, the area was evicted by an integrated team consisting of police officers Lampung, Forest Service, and civilian security forces that shaped the state company PT Silva, which is the cause dispute between the state company PT Silva with hundreds of local farmers. According to the farmers, they do the occupation that is because they do not have another search. Therefore, they are fighting for the land which they still are the property of their rightful. The disputed land extent of 3,600 hectares. The number of farmers who occupied the area previously numbered 800 people and about 300 people are involved in these occupations. The farmers occupying the land because it has received permission from Mr. Megou indigenous stakeholders who claimed the land as customary land.

Once evicted by PT Silva early September 2011, hundreds of farmers fled to the village of Tugu Roda, District Simpang Causeway, Mesuji district, Lampung. In the refugee camps they take any job to survive. Meanwhile, when the eviction, many their homes bulldozed to the ground next to no little property lost. Commission III team found evidence that this case is caused by the State Land Agency (BPN) and PBN Tulang Bawang regency of Lampung province refused resize 7 thousand acres of land managed by farmers . According to Police Chief Tulang Bawang, that in fact the police have asked for BPN to perform repeated measurements but are not willing BPN because it does not get permission from BPN Center and could not be measured because the area is very spacious.

Against this situation, Commission III BPN expressly requested to immediately start measurement. There is a suspicion that the BPN have been affected by the company to refrain from repeated measurements in which the company benefited thereby. It has been argued from the legislature's proposal that a working committee be formed to investigate this case thoroughly below identifies the parties responsible. Parties such as the Minister of Forestry, Lampung Governor and Head of BPN and central regions will be called. While lawmakers are committed to resolve the matter Mesuji from upstream because it is believed that the violence in Mesuji is a result of the problem is contained in the upstream of the agrarian question, including the fact that the Minister of Forestry gave permission expansion to the state company PT Silva to manage land with a larger area ie from the initial 33,000 hectares to 42,000 hectares in 1996 ago. The expansion led to the takeover of indigenous land previously managed by farmers. In addition, efforts will be made to find those who cause problems Mesuji drawn- up for decades without resolution. When it was concluded, the House will then make recommendations to the government official.

Lampung indeed save a lot of history of conflict between citizens and companies. Data from the police office mention that there are many large companies are in conflict with the local community in addition to the state company PT Silva, as the South West PT Makmur Invesindo, PT Aruna Wijaya Sakti, and PT Indo Lampung.

3   OPTIMIZATION FOR CONFLICT MEDIATION MESUJI

To resolve conflicts with companies such cases citizens Register 45 Mesuji, Lampung, mediation is believed to be a comprehensive solution and is able to overcome the problem with the principle of wins solution. As known, mediation as a dispute resolution models, provide a unique offer of settlement, because the process is relatively simple and requires a relatively short time. In addition, costs can be reduced. Mediation also be a prospective alternative because honestly it must be recognized that public confidence in the judiciary was at a very low point so that the process of litigation (court) is only taken when other means before or outside of court to no avail. Mediation is a method of intervention that involves the participation of the parties in a pro - active so therefore the success of mediation is determined by the good faith of the parties to work together to find a way out as agreed.

Aria S. Hutagalung (2005) says that mediation gives the parties a feeling of equality. Efforts to determine the final outcome of negotiations in mediation is achieved by mutual agreement without pressure and coercion so that the resulting solution is a wins solution. These results will be obtained when met several factors such as the objective approach to resources dispute. It would be more acceptable to the parties and able to deliver mutually beneficial results for these approaches are focused on the interests of a source of conflict. Each party to the mediation must also have the ability to negotiate a balanced and discussion. If this is not met, there will be pressure from one party to the other party.

In the context of a comprehensive settlement to the land dispute between citizens Register 45 Mesuji, Lampung, with the state company PT Silva, mediation must be conducted in compliance with the following requirements:

1. Mediator must form a team (team of mediators), not the individual, because the dispute involves citizens in abundance and large companies.
2. Teams also must have the capacity and integrity to earn the trust of the public to be a facilitator for the resolution of problems that they face.
3. Mediation Team truly must master the problem comprehensively and objectively. Data must be obtained from a source that truly neutral and impartial. Each side could supply information that is not neutral. This must watch out, because without full information, mediation will be in favor of one party to the detriment of the other party.
4. Mediation must be planned, with a clear schedule. This shows the commitment and seriousness of the mediation team at the same time to gain the trust of the public that this effort is intended to give the best results and not just a formality.
5. Mediation wherever possible involve traditional leaders. This is important because traditional leaders are clearly influential figure in the midst of society that is generally a reference for residents in performing actions. In the case of Mesuji, as described in the chronology of the dispute over the land, based on the recognition of the community, they manage the land that later became the dispute after obtaining permission from traditional leaders who claimed the land as customary land. Traditional leaders are also the most interested parties for the completion of a conflict between their citizens and companies.

In carrying out mediation, the mediator needs to understand the various possibilities that may contribute to the occurrence of conflicts and the land conflict. Society may have not understand what they should do, especially related state laws and regulations on land treatment. Perhaps many of them are simply just part of the work on the ground, including in occupied land disputes. One of the stages of mediation should be considered is the maximal approach to farmers so that they view the problem wisely and not be emotional. This becomes important because of the events that occurred in the field in general tend to be detrimental to society both economically, socially, including psychological. The case of the killing of citizens in the conflict, including the burning and demolition of houses which are believed by the public has been made by the state company PT Silva, of course, a factor that could complicate the peace between the two sides . The mediator must be able to provide insight to the public not to make such conditions as a barrier for them to find the best solutions.

The mediator must also be wary of the dominance of the owners of capital who can make them lose independence. Mediator under any circumstances should always be independent and self-sufficient. Because the company is generally considered to have the financial resources are very strong, which is feared to have done certain agreements outside mediation scheme, to win their interests. Against this kind of thing, people are usually very sensitive so it is easy to lead to its impact on public confidence in the mediator or whoever was the dispute resolution facilitator. Although in principle the mediation directed to the welfare of society with a weak economy, the mediator should also consider continuing the corporate activities also benefit the local communities directly and more broadly to the country, with really giving them a thorough understanding of the best solution to the problem this.

Technically, this mediation can be guided by decision of the Head of National Land Agency of the Republic of Indonesia Number 34 Year 2007 on Technical Guidelines for Handling and Settlement of Land Problems of the Implementation Mechanism No. 05/Juknis/DV/2007.

The fact that farmers in Register 45 Mesuji cultivate the land by traditional leaders permission somehow to be considered as one of the realities of the application of customary law in the midst of the local community. This is one of the real side of life and the norms of customary law in the society, where traditional leaders know that indigenous lands could be exploited its citizens, while on the other hand people have a good emotional attachment with their customary elders. What is clear, in the Act No. 5 of 1960 on the Rules Basics Basic Agrarian stated that the national agrarian law based on customary law of the land, which is simple and ensure legal certainty for all Indonesian people, to not ignore the elements that lean on religious law.

Implementation mediation course requires operational funds. In this position, each party can expect the mediator will be impartial to compensate them with a certain amount of funds. The company usually considered to have a stronger position to provide financial resources to influence the process of mediation. Team mediation in this case should be very careful and consistently stay away from all forms of effort to influence through money. This is directly related to the

independence of the mediator team. Mediator team obviously will not be able to remain neutral when it has received certain incentives of one of the parties to the dispute.

Mediators also need to give an explanation to the company did not show the arrogant impression on society. In the atmosphere of dispute as happened in this Mesuji , obviously there is a certain sensitivity among residents of the companies in which the company considered arrogant as usual feel stronger both capital and networks to local government and security forces . Meanwhile, on the other hand, to some extent, people can do desperate because they do not have other options in defending their rights.

It is important to be pursued that the media not to provoke the people or companies or spreading news that could lead to disruption of the process of mediation. The media are supposed to create a conducive atmosphere so that people and companies have a strong desire to solve the problem optimally. Similarly, the community leaders, they must unite searching for the best solution, and do not even exploit the situation for political gain at the expense of the public shortly.

4 CONCLUSION

When land disputes Register 45 Mesuji, Lampung, can be optimally solved by mediation, then the various agrarian conflict that occurred in various regions in Indonesia is also expected to be completed in more comprehensively. Mediation Register 45 Mesuji land dispute with the state company PT Silva then mediation can be an effective prototype models against similar cases in other areas , so that the spirit of the Act No. 5 of 1960 concerning Regulation Basics Basic Agrarian , namely to maximize the function of land for as much as the public welfare can be realized.

Various cases are still occurring in many areas is actually a serious problem in society that they should look for the solution thoroughly. The state should provide maximum support and support for the success of mediation in real agrarian issues will also give effect to strengthen the level of public confidence in the government that are considered truly care about the fate of the citizens.

The next thing to consider is also still needed socialization National Land Law. Although it has been more than half a century old , the Act No. 5 of 1960 concerning Regulation Basics Basic Agrarian still very much unknown to the public , especially as farmers Register 45 Mesuji community that is geographically situated in a location that is far from the touch of education maximum .

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L'inflation sous-jacente en Tunisie : une application de l'approche VAR structurel

[Core inflation in Tunisia: an application of the structural VAR approach]

Rima Lajnaf

Département des Sciences Economiques,
Faculté des Sciences Economiques et de Gestion
Université de Sfax, Tunisie

ABSTRACT: Since the creation of money, a good reading of inflation evolutions is an essential element for many economic actors. However, inflation as measured by the consumer price index represents some volatility. Indeed, since its establishment, the general price index shows a marked seasonality and its level rises irregularly. Therefore, It is essential for a central bank to distinguish in the evolutions of the inflation between what is simply noise , destined to disappear quickly, what is a sustainable trend. In the context of price stability that have adopted the aim of their monetary policy, central banks should control and have an accurate measure of structural inflation, namely the component corrected by the influence of economic cycle, because it is this element that is monetary origin. This component of inflation, called core inflation is obtained by canceling the cyclical component attributed to shocks on output. We try in this work to measure the main component of inflation in Tunisia from a structural VAR. The results comfort the choice of the approach because the calculated core inflation seems broadly in compliance with that waited on the theoretical plan.

KEYWORDS: Price stability, core inflation, Structural VAR, Tunisia.

RESUME: Depuis la création de la monnaie, une bonne lecture des évolutions de l'inflation représente un élément essentiel pour nombreux acteurs économiques. Toutefois, l'inflation telle qu'elle est mesurée par l'indice des prix à la consommation représente une certaine volatilité. En effet, depuis sa mise en place, cet indice général des prix présente une saisonnalité marquée et son niveau s'élève irrégulièrement. Il est donc indispensable pour une banque centrale de distinguer dans les évolutions de l'inflation ce qui relève du simple bruit, destiné à disparaître rapidement, de ce qui relève d'une tendance durable. Dans le cadre de la stabilité des prix que ont adopté comme objectif de leur politique monétaire, les banques centrales doivent maîtriser et disposer d'une mesure précise de l'inflation structurelle, c'est-à-dire celle corrigée de l'influence du cycle économique, car c'est cette composante de l'inflation qui est d'origine monétaire. Cette composante de l'inflation, appelée inflation sous-jacente est obtenue en annulant la composante cyclique attribuée aux chocs survenus sur la production. Nous essayons, dans ce travail, de mesurer cette principale composante de l'inflation en Tunisie à partir d'un VAR structurel. Les résultats réconfortent le choix de l'approche puisque l'inflation sous-jacente calculée semble globalement conforme à celle attendue sur le plan théorique.

MOTS-CLEFS: Stabilité des prix, inflation sous-jacente, VAR structurel, Tunisie.

1   INTRODUCTION

L'objectif principal de la plupart des banques centrales est la stabilité des prix. L'analyse théorique et empirique de la hausse des prix occupe l'attention de nombreux économistes depuis des années. Plusieurs travaux ont montré que l'inflation

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telle qu'elle est mesurée par l'indice des prix à la consommation (IPC), représente une certaine volatilité. En effet, depuis sa mise en place, l'IPC présente une saisonnalité marquée. Son niveau s'élève irrégulièrement. La saisonnalité des prix de certains biens évolue d'une façon irrégulière d'une année à une autre. Il est donc très intéressant pour les banques centrales de savoir discerner dans les évolutions de l'inflation ce qui relève du simple bruit, destiné à disparaître rapidement, de ce qui relève d'une tendance durable. En effet, dans le cadre de la stabilité des prix que ont adopté comme objectif ultime de leur politique monétaire, les banques centrales doivent maîtriser et disposer d'une mesure précise de l'inflation structurelle, c'est-à-dire celle corrigée de l'influence du cycle économique, car c'est cette composante de l'inflation qui est d'origine monétaire. Cette composante de l'inflation, appelée aussi inflation sous-jacente est déduite en annulant la composante cyclique imputable aux chocs survenus sur la production. Cette composante est obtenue dans ce travail à partir d'un VAR struturel.

La méthode d'identification utilisée dans ce travail est celle proposée par [1]. Ref. [2] l'utilisent pour calculer l'inflation sous-jacente au Royaume-Uni, [3] l'emploie pour mesurer cette inflation structurelle en France, en Allemagne et au Royaume-Uni, [4] l'appliquent en Inde…. Nous reprenons cette démarche et nous l'appliquons à la Tunisie.

2 DÉFINITION DE L'INFLATION SOUS-JACENTE

Généralement, l'objectif final de stabilité des prix est fixé en fonction de l'IPC. Néanmoins, ces dernières années, plusieurs banques centrales ont défini l'inflation en excluant les composantes très volatiles de l'indice des prix. Cette composante principale de l'inflation déduite en annulant la composante cyclique imputable aux chocs survenus sur la production est connue sous le vocable de l'inflation sous-jacente. Elle doit négliger les fluctuations temporaires qui n'ont pas d'impact à long terme sur les prix et représenter ce qui est fondamental dans les mouvements de prix. Le phénomène de l'inflation sous-jacente doit avoir un caractère persistant pour que l'analyse de l'inflation ait un sens [5]. D'après [6], l'indice d'inflation sous-jacente est un indice désaisonnalisé qui exclut les prix soumis à l'intervention des mouvements transitoires liés à des facteurs climatiques ou à des tensions sur les marchés mondiaux.

La nécessité de disposer de mesures de l'inflation sous-jacente au sein des banques centrales pourrait se justifier par leur mission de préserver la stabilité des prix. En effet, la décision prise de poursuivre les objectifs d'inflation a renforcé la nécessité de disposer d'indicateurs d'inflation sous-jacente. Selon [7], l'évolution des prix de plusieurs biens a toujours été affectée par divers chocs d'offre ou de demande tels que :

- les chocs d'offre alimentaire ;
- les chocs liés au déficit de la production et des perturbations dans la distribution de l'énergie ;
- les chocs pétroliers;
- les chocs lies à la hausse des salaires ;
- les chocs fiscaux.

En effet, une politique monétaire qui vise à assurer la stabilité des prix en s'appuyant que sur l'indice général des prix ne serait pas très efficace si elle devait être soumise au rythme des fluctuations des composantes volatiles [9].

3 LA MÉTHODOLOGIE DES VAR STRUCTURELS

Un modèle VAR (Vector Auto Regressive) indique comment le passé d'un ensemble de variables agit sur le présent de ces mêmes variables et comment des chocs sur une variable se transmettent au reste du système. Les modèles VAR ont été popularisés par [8] puis développés par [1]. Il s'agit d'estimer la dynamique générale d'un système et d'arriver à décrire son comportement par rapport à un choc sur les termes d'erreur. Il faut pour cela imposer certaines restrictions sur le modèle et la façon la moins arbitraire de le faire consiste à utiliser les VAR structurels tels qu'introduits par [2].

Vu que les résultats de l'estimation et de la mesure de l'inflation sous-jacente sont strictement liés à la spécification du VAR retenue, une présentation du VAR structurel utilisé dans la présente étude s'avère importante. Nos contraintes d'identifications sont déduites des travaux de [1] où les chocs d'offre et de demande sont bien distingués. Pour l'identification des composantes transitoires et permanentes de la production, les auteurs supposent que, contrairement au choc de demande, le choc de l'offre agit sur la production à long terme.

Les deux variables du VAR utilisé dans cette étude sont la production industrielle et l'inflation. Pour les mêmes raisons de [2], la première variable est mesurée par l'indice de production industrielle (IPI) et non pas par le produit intérieur brut (PIB). En effet, cette variable est disponible en données mensuelles alors que les séries de PIB ne sont que trimestrielles ou annuelles. Quant à l'inflation, elle est présentée par l'IPC. Dans le présent travail, l'analyse de l'inflation sous-jacente en

Tunisie s'appuie sur une base de données mensuelle d'une période s'étalant entre 2000 et 2013 obtenue auprès de l'institut national de la statistique.

Le choc monétaire est associé à l'inflation sous-jacente. Quant au deuxième choc représentant le choc réel, il affecte la production à long terme. Le critère d'identification du VAR structurel retenu est, par conséquent, la neutralité à long terme du choc monétaire sur la production [3]. Malgré que divers chocs puissent affecter l'inflation à court terme, la détermination de l'inflation sous-jacente par le seul choc monétaire, n'est pas trop contraignante puisque la politique monétaire est le monopole de la banque centrale.

3.1 LE CALCUL DES RÉPONSES DU VAR

Nous supposons que l'économie tunisienne, est gouvernée à différents instants par deux types de chocs : les chocs d'offre et les chocs de demande. Nous présumons que seuls les chocs d'offre peuvent avoir des effets permanents sur l'activité et que les chocs de demande n'ont que des effets transitoires.

D'une façon générale, le modèle VAR structurel d'ordre p, où X_t est de dimension n, s'écrit sous la forme suivante :

$$A(L)X(t) = \varepsilon_t \qquad (1)$$

Avec :

$$E(\varepsilon_t \varepsilon_t') = I$$

$Var(\varepsilon) = \Sigma_\varepsilon$ est une matrice diagonale

$$A(L) = \sum_{j=0}^{p} A_j L^j$$

La forme autorégressive (1) admet la présentation de Wold suivante :

$$X(t) = D(0)\varepsilon(t) + D(1)\varepsilon(t-1) + \ldots\ldots = \sum_{j=0}^{\infty} D(j)\varepsilon(t-j) \qquad (2)$$

c'est-à-dire :

$$X(t) = D(L)\varepsilon_t \qquad (3)$$

Avec : $D(L) = \sum_{j=0}^{\infty} D_j L^j$ et $D(L) = A(L)^{-1}$

Établissons le lien entre ces écritures et les réponses aux chocs. Nous nous intéressons ici aux réponses à l'horizon donné s d'une variable $X_{i,t}$ consécutivement à un choc unitaire sur la $j^{ème}$ composante de ε_t, tout autre élément du système est laissé constant. Ref. [3] simule dans ce cas le système en posant $\varepsilon_{j,t} = 1$ avec $X_{t-1} = X_{t-2} = \ldots\ldots = X_{t-p} = 0$.

Les réponses au choc $\varepsilon_{j,t}$ composeront la $j^{ème}$ colonne de la matrice D_s, soit $D_{*j,s}$ issue de la représentation en moyennes mobiles infinies (3). En effet, ces matrices peuvent s'interpréter comme $D_s = \frac{\partial X_{t+s}}{\partial \varepsilon_t'}$ et l'élément de la $i^{ème}$ ligne et de la $j^{ème}$ colonne de la matrice D_s représentera justement cette réponse, en $t+s$, de X_i à un choc orthogonal sur X_j.

$$D_{ij,s} = \frac{\partial X_{i,t+s}}{\partial \varepsilon_{j,t}}$$

Dans notre cas, où le VAR retenu est bivarié, les observations de la production et de l'inflation dont il inclut, vont nous permettre d'identifier les deux chocs précités. Toutefois, les tests de stationnarité et de cointégration nécessitent une vérification. Les résultats montrent que les deux variables sont stationnaires en première différence et qu'il n'existe aucune relation de cointégration entre elles. Cela nous permet d'écrire notre VAR en différences premières sur l'IPI et sur l'IPC. Le fait que les variables ne soient pas cointégrées, la forme moyenne mobile bivariée peut donc s'écrire comme suit :

$$\begin{cases} \Delta y_t = \sum_{j=0}^{\infty} \alpha_{11}(j)L^j \varepsilon_{1t} + \sum_{j=0}^{\infty} \alpha_{12}(j)L^j \varepsilon_{2t} \\ \Delta p_t = \sum_{j=0}^{\infty} \alpha_{21}(j)L^j \varepsilon_{1t} + \sum_{j=0}^{\infty} \alpha_{22}(j)L^j \varepsilon_{2t} \end{cases} \qquad (4)$$

Δy_t et Δp_t sont les différences premières de l'IPI et de l'IPC. ε_{1t} représente le choc réel alors que ε_{2t} représente le choc monétaire. $\alpha_{12}(j)$ sera l'effet de ε_{2t} sur Δy après j périodes. Il est alors intéressant de déterminer l'effet de ce choc monétaire sur le niveau de y. Si, $\alpha_{12}(j)$ sera l'effet de ε_{2t} sur Δy après j périodes, alors $\sum_{j=0}^{k} \alpha_{12}(j)$ sera l'effet de ε_{2t} sur le niveau de y et non pas sur la différence première après k périodes. L'effet à long terme peut alors s'écrire $\sum_{j=0}^{\infty} \alpha_{12}(j)$.

Une fois le modèle VAR structurel est défini, il nous faut retrouver les erreurs structurelles à partir des innovations de la forme réduite du VAR, puisque les ε_t ne sont pas directement observables. La forme réduite du modèle VAR estimé peut s'écrire sous la forme suivante:

$$X(t) = B(L)X(t) + v_t \qquad (5)$$

Avec :

$$Var(v_t) = \Omega$$

$$B(L) = \sum_{j=0}^{p} B_j L^j \quad \text{et} \quad B_i = A_0^{-1} A_i$$

$$X(t) = \begin{bmatrix} \Delta y_t \\ \Delta p_t \end{bmatrix}$$

La représentation en moyennes mobiles sera alors :

$$X(t) = v(t) + C_1 v(t-1) + \ldots\ldots\ldots = \sum_{j=0}^{\infty} C(j)v(t-j) \qquad (6)$$

C'est-à-dire : $X(t) = C(L)v_t$ \qquad (7)

Où : $C(L) = \sum_{j=0}^{\infty} C_j L^j$ \qquad et \qquad $Var(v_t) = \Omega$

Si nous admettons que cette représentation est obtenue par inversion de la forme autorégressive stationnaire $X(t)$, alors cette forme de moyenne mobile est unique.

Il découle des équations (2) et (6) précédentes que :

$$v_t = D(0)\varepsilon(t) = A_0^{-1} \varepsilon(t) \qquad (8)$$

et que : $\Omega = D(0)\sum_{\varepsilon} D'(0) = P\sum_{\varepsilon} P'$ \qquad (9)

avec $A_0^{-1} = D(0) = P$

Puisque les résidus v_t sont une combinaison linéaire des chocs ε_t (équation (8)), et compte tenu des équations (3) et (7) :

$$\begin{aligned} D(L) &= C(L)D(0) \\ D(L) &= C(L)A(0)^{-1} \\ D(L) &= C(L)P \end{aligned} \qquad (10)$$

3.2 LE PROBLÈME D'IDENTIFICATION

Le problème d'identification est de déterminer un passage unique de la forme réduite (5) ($X(t) = B(L)X(t) + v_t$), à la forme structurelle (1) ($A(L)X(t) = \varepsilon_t$ **).** Dans le cas général $n(np+1) + \dfrac{n(n+1)}{2}$ paramètres caractérisent la distribution, dans le second, il y en a $n(n(p+1)+1) + \dfrac{n(n+1)}{2}$ paramètres, qui est égal à $n^2 + n(np+1) + \dfrac{n(n+1)}{2}$ paramètres .

La forme structurelle comprend donc n^2 paramètres de plus que la première. Il nous faut alors trouver n^2 contraintes identifiantes.

D'après [3], la méthode habituelle est d'imposer des contraintes de nullité sur les matrices de coefficients des variables prédéterminées. Mais cette technique peut être critiquée puisque nous disposerions de trop peu d'éléments théoriques pour imposer de telles restrictions. C'est pourquoi, pour l'identification d'un VAR structurel, des contraintes sont imposées sur la matrice de variance-covariance des chocs ($\sum_{\varepsilon}$) ainsi que sur la matrice de coefficients des variables contemporaines (A_0) et/ou sur les multiplicateurs de long termes ($A(1)^{-1}$). Puisque tous les éléments de la diagonale de la matrice des variables contemporaines sont égaux à 1, nous gagnons n paramètres, et il en reste $n^2 - n$. Les autres contraintes doivent, pour l'identification d'un VAR structurel, être imposées comme contraintes d'orthogonalisation de la matrice des variances-covariances des chocs, et comme contraintes empruntées à la théorie économique sur la matrice de coefficients des variables contemporaines et/ou sur les multiplicateurs de long terme. Lorsqu'il s'agit des contraintes imposées à la matrice de variance-covariance des chocs, il est supposé que cette dernière est diagonale, c'est-à-dire que les chocs sont orthogonaux. Si nous supposons que $\sum_{\varepsilon} = I$, cela implique que $\Omega = D(0)D(0)'$.

$$\Omega = PP' \tag{11}$$

Après cette opération, $\dfrac{n(n+1)}{2}$ paramètres sont contraints, il reste à trouver $\dfrac{n(n-1)}{2}$ contraintes supplémentaires. L'objet d'identification est de déterminer de manière unique la matrice $P = A(0)^{-1}$ qui permettra de déduire les chocs orthogonaux, qui sont non observables, à partir des résidus (observables) du VAR de l'équation (5), de passer de manière unique de la forme réduite à la forme structurelle. Nous sommes maintenant confronté à un problème de sous-identification[1] car devant résoudre un système de $\dfrac{n(n+1)}{2}$ équations pour n^2 inconnues, des contraintes supplémentaires doivent être ajoutées. Ces dernières viennent donc des hypothèses faites sur les paramètres. Dans le cas le plus général, ces contraintes conduisent à l'annulation d'éléments tant de la matrice à court terme (composantes i et j de la matrice D_0) que de celle de long terme (composantes k et l de la matrice $D(1)$), et le système à résoudre pour déterminer $P(P = D(0))$ est le suivant :

$$
\begin{cases}
[C_0 D(0)]_{i,j} = 0 \\
[C(1)D(0)]_{k,l} = 0 \\
D(0)D(0)' - \Omega = 0
\end{cases}
\Rightarrow
\begin{cases}
[C_0 P]_{i,j} = 0 \\
[C(1)P]_{k,l} = 0 \\
PP' - \Omega = 0
\end{cases}
\tag{12}
$$

Le cas particulier, où les restrictions se limitent à imposer que la matrice des multiplicateurs de long terme $D(1)$ est triangulaire inférieure ($[C(1)P]_{k,l} = 0$ pour $k \langle l$) ainsi que $\Omega = D(0)D(0)' = PP'$, est beaucoup plus facile à traiter. La détermination de P ne nécessite plus la résolution d'un système mais vient immédiatement de la décomposition de Choleski de $C(1)\Omega C(1)'$. Le système est alors juste identifié. Ainsi, sachant que $D(1) = C(1)D(0)$ (équation (10)) est

---

[1] Dans le cas où la forme structurelle comporte plus de paramètres que la forme standard, et si aucune restriction n'est posée, le système structurel restera sous-identifié. En le retreignant, s'il comporte autant de paramètres que la forme standard, nous disons alors qu'il est juste-identifié. Si le nombre de paramètres devient inférieur, le système est dit sur-identifié, et des tests de sur-identification doivent être effectués de façon complémentaire. Nous travaillons généralement avec des systèmes juste-identifiés pour les modèles VAR.

triangulaire inférieure et que $\Omega = PP'$, et puisque par ailleurs Ω et $\varepsilon(1)$ sont inconnus, P est obtenue aisément à partir de la décomposition de Choleski, par définition la matrice triangulaire inférieure telle que :

$$D(1)D(1)' = C(1)D(0)D(0)'C(1)' = C(1)PP'C(1)' = C(1)\Omega C(1)' \qquad (13)$$

En effet, pour toute matrice Q telle que :

$$QQ' = C(1)\Omega C(1)'$$

Nous avons : $Q = D(1) = C(1)D(0) = C(1)P$

et donc $\quad D(0) = C(1)^{-1}Q$ c'est à dire $P = C(1)^{-1}Q \qquad (14)$

En particulier, le cas bivarié, comme c'est le notre, pour lequel une seule contrainte (puisque $\frac{n(n-1)}{2} = 1$) suffit à l'identification des deux chocs orthogonaux $\varepsilon_{1,t}$, $\varepsilon_{2,t}$ revient concrètement à annuler le côté supérieur droit de la matrice d'impact à long terme puisque cette contrainte supplémentaire tirée de la théorie économique sera donnée par la restriction de long terme selon laquelle le choc monétaire n' a pas d'effet à long terme sur l'activité. Cela revient nécessairement au cas où la matrice des multiplicateurs est triangulaire inférieure.

Ce dernier cas sera le notre. Notre attention va porter sur les réponses D_s qui caractériseront les réponses de la production et de l'inflation ($X_{1,t}$ et $X_{2,t}$ dans les notations précédentes) à deux chocs indépendants $\varepsilon_{1,t}$ et $\varepsilon_{2,t}$. La contrainte d'identification viendra de la définition de l'inflation sous-jacente.

4   VALIDITÉ DU SCHÉMA D'IDENTIFICATION

Après la détermination du modèle VAR pour l'extraction de l'inflation sous-jacente, il nous faut vérifier, à partir de la décomposition de la variance de l'erreur de prévision et de l'étude des fonctions d'impulsions, que notre schéma d'identification peut être considéré comme valide. Nous attendons que les résultats soient en faveur de la neutralité du choc monétaire sur la production à long terme. Une fois notre hypothèse est confirmée et notre schéma d'identification est valide, nous calculerons l'inflation sous-jacente à partir de l'imposition de quelques restrictions.

4.1   DÉCOMPOSITION DE LA VARIANCE DE L'ERREUR DE PRÉVISION

Dans le cas d'une prévision réalisée à partir d'un VAR, nous savons déjà à la suite des études de [8] que nous pouvons décomposer la variance de l'erreur de prévision de manière à faire ressortir la proportion liée à chaque choc.

L'erreur de prévision à l'horizon s est l'écart entre la série observée et la prévision à l'horizon $t + s$ périodes obtenues à partir de la représentation (3) ($x_t = D(L)\varepsilon_t$). Pour chacune des séries, le pourcentage de la variance de l'erreur de prévision $\varepsilon_{2,t}$ est donc calculé.

Pour une série donnée, la somme des contributions des deux chocs vaut 100%. Le complémentaire à 100 donne alors la contribution de $\varepsilon_{1,t}$. Puisque la contrainte d'identification impose l'indépendance à long terme de y_t vis-à-vis de $\varepsilon_{2,t}$, sa contribution à y_t doit être très faible à long terme. Le court et le moyen terme ne sont pas contraints.

Le tableau 1 qui présente le pourcentage de la variance expliquée par le choc monétaire montre effectivement que ce dernier n'a pas d'incidence sur l'activité. Sur un horizon de 1 à 160, le choc monétaire n'explique que moins de 10% de l'erreur de prévision de l'activité de la Tunisie. Ce résultat peut paraître trivial puisqu'il est conforme à notre schéma d'identification retenu et qui suppose que le choc monétaire n'ait pas d'effet sur l'activité à long terme. Concernant l'inflation, la quasi-totalité de sa variance est expliquée par le choc ε_{2t} qui est assimilé au choc monétaire, ce qui n'est pas surprenant.

Tableau 1.   *Décomposition de la variance : Pourcentage de la variance expliquée par le choc monétaire*

horizon	Production en Tunisie	Inflation en Tunisie
1	1.26234	98.16180
2	4.17065	97.46451
3	5.13100	97.46329
4	5.69848	95.95877
5	7.13230	93.44901
6	7.26386	90.10979
12	9.66027	88.63416
24	9.75404	85.78758
48	9.64823	84.09645
60	9.63489	83.95134
120	9.62620	83.86161
160	9.62613	83.86084

4.2   LES FONCTION D'IMPULSION

L'analyse des réponses impulsionnelles pour la Tunisie présentée dans le graphique 1 confirme les résultats obtenus avec la décomposition de la variance et valide, par conséquent, nos critères d'identification.

En ce qui concerne l'inflation, nous observons que le choc monétaire a un effet permanent et significatif. Ce résultat est tout à fait conforme à la théorie, puisqu'il est admis que cette composante commande l'inflation à long terme. Lorsqu'il s'agit du choc réel, l'impact sur l'inflation est presque nul. L'inflation est par suite déterminée par le seul choc monétaire. Pour la production, le graphique 1 montre que le choc ε_{2t} n'a pas d'effet à long terme sur la production. Ce résultat est en conformité avec la contrainte d'identification.
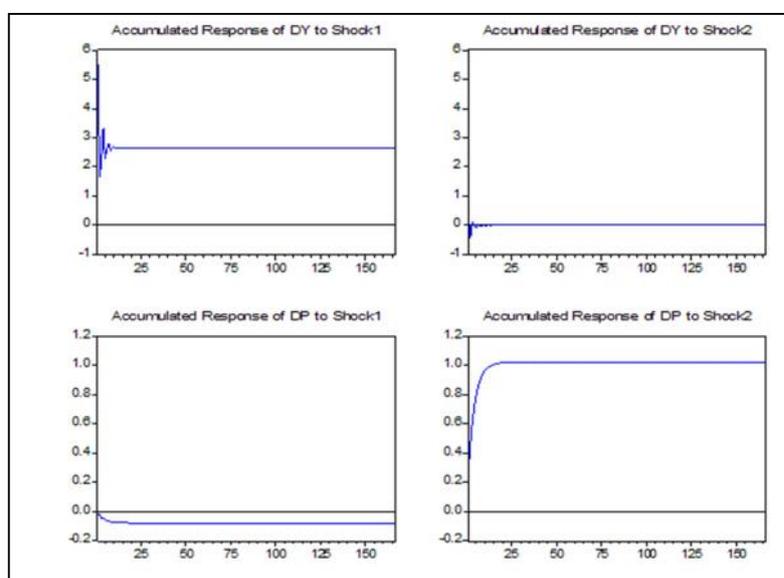

Fig. 1.   Comparaison de l'effet des chocs sur la production et sur l'inflation en Tunisie

5   CALCUL DE L'INFLATION SOUS-JACENTE

5.1   MÉTHODE DE CALCUL

La lecture des fonctions d'impulsions et de décomposition de la variance nous a permis de valider notre méthode d'identification. Nous allons maintenant nous intéresser à définir et à calculer l'inflation sous-jacente.

Etant donné que la variation de l'IPI (Δy_t) et la variation de l'inflation mesurée par l'IPC en niveau (Δp_t) sont stationnaires, nous retenons donc un VAR d'ordre p avec $X_t = (\Delta y_t \ \Delta p_t), t = 1.........T$.

La représentation (3) s'écrit alors :

$$\begin{pmatrix} \Delta y_t \\ \Delta p_t \end{pmatrix} = \begin{pmatrix} D_{11}(L) & D_{12}(L) \\ D_{21}(L) & D_{22}(L) \end{pmatrix} \begin{pmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \end{pmatrix} \tag{15}$$

Avec $D_{ij}(L) = \sum_{m=0}^{\infty} D_{ij,m} L^m$

L'accroissement de l'inflation se décompose :

$$\Delta p_t = D_{21}(L)\varepsilon_{1,t} + D_{22}(L)\varepsilon_{2,t} \tag{16}$$

L'inflation sous-jacente étant entre ces deux composantes, celle qui respecte la contrainte de neutralité à long terme, s'écrit alors comme suit :

$$\Delta p_t^{sj} = D_{22}(L)\varepsilon_{2,t} \tag{17}$$

et

$$\Delta p_t^{sj} = \sum_{m=0}^{\infty} D_{22}(L)\varepsilon_{t-s} \tag{18}$$

L'inflation sous-jacente est la composante de l'inflation observée associée à $\varepsilon_{2,t}$ qui représente le choc qui n'a pas d'influence à long terme sur la production. Comme les variables endogènes sont stationnaires en différence, le choc $\varepsilon_{2,t}$ n'a par définition aucun effet à long terme sur Δy_t mais nous souhaitons que cette contrainte de neutralité soit vérifiée par y_t en niveau. C'est pour cette raison que la contrainte s'écrit $D_{12}(1) = \sum_{m=0}^{\infty} D_{12,m} = 0$, c'est-à-dire le coin supérieur droit de $D(1)$ est nul ou, en d'autres termes, que $D(1) = A(1)^{-1}$ est triangulaire inférieure. Pour la résolution du notre problème d'identification, nous allons utiliser cette dernière contrainte découlant de la définition de l'inflation sous-jacente. En outre, à partir de cette dernière relation, nous pouvons mesurer l'inflation sous-jacente pour un horizon s quelconque:

$$\Delta p_0^{sj} = D_{22,0}\varepsilon_{2,0}$$
$$\Delta p_1^{sj} = D_{22,0}\varepsilon_{2,1} + D_{22,1}\varepsilon_{2,0}$$
$$\Delta p_2^{sj} = D_{22,0}\varepsilon_{2,2} + D_{22,1}\varepsilon_{2,1} + D_{22,2}\varepsilon_{2,0}$$
$$.$$
$$.$$
$$.$$

5.2 LES RÉSULTATS

En première observation du graphique 2 présentant l'évolution de la variation de l'inflation et de l'inflation sous-jacente, nous constatons que les deux séries ont le plus souvent des évolutions assez proches. Cela n'est pas surprenant puisque l'inflation sous-jacente représente la tendance lourde de l'inflation et tient compte de ses évolutions.
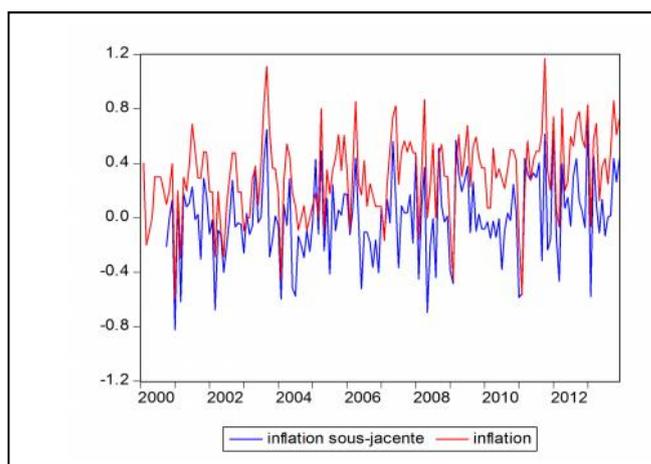
Fig. 2.   Evolution de l'inflation et de l'inflation sous-jacente en Tunisie

L'inflation présentée dans le graphique présente certaines volatilités. Il est donc intéressant aux autorités monétaires tunisiennes de savoir distinguer dans ce qui relève du simple bruit, destiné à disparaître rapidement, de ce qui relève d'une tendance plus durable. Malgré que les différences entre les variables, telles que présentées dans le graphique 2, soient en général faibles, l'inflation sous-jacente peut révéler des informations utiles pour la conduite de la politique monétaire.

L'évolution de la variation des deux séries montre que celle de l'inflation sous-jacente reste en dessous de l'inflation observée, ce qui justifie que la Tunisie a connu un taux d'inflation élevé pour la plupart des années. Ceci peut être expliqué par la non adoption du ciblage d'inflation explicitement en tant que stratégie de la politique monétaire de la BCT. Nous notons, d'après le graphique, qu'en 2005, l'inflation sous-jacente est très proche de celle observée. Ce rapprochement entre les deux types d'inflation peut être expliqué par la politique adoptée de stabilité des prix au sein de la BCT durant cette année et qui a pu faire baisser le taux d'inflation à 2%.

Une hausse annuelle croissante des prix des produits énergétiques explique les importantes fluctuations des prix au cours de 2006, 2007 et 2008. La flambée des prix de pétrole en 2006 (le prix d'un baril de pétrole a passé de 37,76$ en 2005 à 53,35$ en 2006) a eu comme effet une hausse de l'inflation. En outre, le taux d'inflation est devenu 4,5% en 2006 et 4.9% en 2008 bien qu'il soit maîtrisé à 2% en 2005. L'écart observé en 2012 entre l'évolution des deux variables est justifié par l'inflation élevée qu'a connue la Tunisie durant cette année et qui a atteint 6%.

Nous le voyons, les tensions conjoncturelles sont le moteur de l'inflation et il est intéressant dès lors, de donner une importance majeure à l'inflation sous-jacente c'est-à-dire l'évolution du niveau général des prix, débarrassé de sa composante conjoncturelle.

6   CONCLUSION

L'objectif de ce travail est de déterminer l'inflation sous-jacente en Tunisie en utilisant l'approche des VAR structurels. La lecture de la décomposition de la variance et des graphiques impulsionnelles montre que l'identification des chocs réels et monétaires est bien assurée et que, sur la base de contrainte de neutralité à long terme de l'inflation sur la production, l'inflation sous-jacente peut être calculée à partir de cette approche des VAR structurels. Les résultats réconfortent le choix de l'approche puisque l'évolution de l'inflation sous-jacente calculée semble globalement conforme à celle attendue sur le plan théorique.

La mesure de l'inflation sous-jacente doit permettre aux banques centrales de reconnaître à temps une variation des tendances inflationnistes d'origine monétaire. Pour cela, diverses banques centrales ont défini leur objectif d'inflation sur la base de l'inflation sous-jacente. En outre, même si les banques centrales fixent leur principal objectif en fonction de l'inflation observée, elles ont intérêt à connaître le degré de prévisibilité de l'inflation sous-jacente qui est censée refléter la tendance inflationniste d'origine monétaire.

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