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Existence Of Weak Solutions For The Riemann–StieltjesFunctional (Delayed)Integral Equations

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وجود حلول ضعيفة للمعادلة التكاملية الدالية (المتأخرة) ريمان استليجس

الدكتورة مسعودة موسى عبدالحميد الفضيل

جامعة درنة – كلية العلوم – فرع القبة

الملخص :

نقوم بدراسة تواجد حل ضعيف واحد على الاقل للمعادلة التكاملية الدالية (المتأخرة) من نوع ريمان استيلجيس

$$x(t) = a(t) + \lambda \int_0^t f(s, x(\psi(s)), y(\omega(s)))d_s g(t,s), \qquad t \in I = [0,T]$$

في فضاء بناخ الانعكاسي E. وأيضا إثبات تواجدالحد الأقصى و الحد الأدنى من الحلول الضعيفة تحت شروط معينة.

Abstract

We present an existence theorem for at least one weak continuous solution for a nonlinear functional (delayed) integral equations of Riemann–Stieltjes type

$$x(t) = a(t) + \lambda \int_0^t f(s, x(\psi(s)), y(\omega(s)))d_s g(t,s), \qquad t \in I = [0,T].$$

Also, we prove the existence of the weak maximal and weak minimal solutions.

AMS Subject Classification: 26A42, 35D30, 47H30.

Keywords : Weak solution, Riemann–Stieltjes integral, weak maximal and weak minimalsolutions, weakly relatively compact.

1 Introduction and Preliminaries

Consider the Volterra−Stieltjes integral equation

$$x(t) = p(t) + \int_0^t f\big(s, x(s)\big) d_s g(t,s), \qquad t \in I = [0,T] \tag{1}$$

where $g; I \times I \to \mathbb{R}$ is nondecreasing in the second argument on I and the symbol d_s indicates the integration with respect to s. J. Banaś [4] proved the existence of at least one solution $x \in C(I)$. We remark here that, when $E = \mathbb{R}$ this type of equations have been studied by Banaś (see [2]−[7]).

In this paper, we study the existence of weak solutions $x \in C[I, E]$ of the Riemann−Stieltjesfunctional (delayed) integral equation

$$x(t) = a(t) + \lambda \int_0^t f(s, x(\psi(s)), y(\omega(s))) d_s g(t,s), \qquad t \in I = [0,T].$$
(2)

Also, we study the existence of the weak maximal and weak minimal solutions.

In [14], the authors proved the existence of weak solutions $x \in C[I, E]$ of Volterra−Stieltjes integral equation (1).

Let E be a reflexive Banach space with norm$\|\,.\,\|$ and dual E^*. Denote by $C[I, E]$ the Banach space of strongly continuous functions $x : I \to E$ with sup−norm.

Now, we shall present some auxiliary results that will be need in this work. Let E be aBanach space (need not be reflexive) and let $x : [a, b] \to E$, then

(1−) $x(.)$ is said to be weakly continuous (measurable) at $t_0 \in [a,b]$ if for every $\varphi \in E^*$, $\varphi(x(.))$ is continuous (measurable) at t_0.

(2−) A function $h : E \to E$ is said to be weakly sequentially continuous if h maps weakly convergent sequences in E to weakly convergent sequences in E.

If x is weakly continuous on I, then x is strongly measurable and hence weakly measurable(see [17] and [11]). It is evident that in reflexive Banach spaces, if x is weakly continuousfunction on $[a,b]$, then x is weakly Riemann integrable (see [17]). Since the space of allweakly Riemann− Stieltjes integrable functions is not complete, we will restrict our attentionto the existence of weak solutions of equation (2) in the space $C[I,E]$.

Definition 1.Let $f : I \times E \to E$. Then $f(t,u)$ is said to be weakly− weakly continuous at (t_0, u_0) ifgiven $\epsilon > 0$. $\varphi \in E^*$ there exists $\delta > 0$ and a weakly open set U containing u_0 such that

$$|\varphi(f(t,u) - f(t_0,u_0))| < \epsilon$$

Whenever

$|t - t_0| < \delta$ and $u \in U$.

Now, we have the following fixed point theorem, due to O'Regan, in the reflexive Banach space

((see [21])) and some propositions which will be used in the sequel (see [15]).

Theorem 1. Let E be a Banach space and let Q be a nonempty, bounded, closed and convexsubset of $C[I,E]$ and let $F:Q\to Q$ be a weakly sequentially continuous and assume that$FQ(t)$ is relatively weakly compact in E for each $t\in I$. Then, F has a fixed point in the set Q.

Proposition 1. In reflexive Banach space, the subset is weakly relatively compact if and only if

it is bounded in the norm topology.

Proposition 2. Let E be a normed space with $y\in E$ and $y\neq 0$. Then there exists a $\varphi\in E^{*}$with$\|\varphi\|=1$ and $\|y\|=\varphi(y)$.

Proposition 3. A convex subset of a normed space E is closed if and only if it is weaklyclosed.

2 Main results

In this section, we present our main result by proving the existence of weak solutions forequation (2) in the reflexive Banach space. Let us first state the following assumptions:

(i)$a\in C[I,E]$, $\lambda\in\mathbb{R}$.

(ii) ψ,ω are continuous functions such that $\psi(s),\omega(s)\leq s$.

(iii) $f:I\times D\times D\to E$, where $D\subset E$, satisfy the following conditions:

(1) $f(s,x(\psi(s)),y(s))$ is continuous function, $\forall\, s\in I, x,y\in D\subset E$.

(2) $f(.,.,.)$ is weakly–weakly continuous function, $\forall\, s\in I$.

(3) $\|f(s,x,y)\|\leq m(s)+b(max\{\|x\|,\|y\|\})$, $m:I\to I$ are continuous functions, b is positiveconstant for $s\in I$, $x,y\in D$. Moreover, we put $M=\max\{m(s):s\in I\}$.

(iv) The functions $g : I \times I \to R$ and the functions $t \to g(t,t)$ and $t \to g(t,0)$ are continuouson I. Put $\mu = \max\{sup_t|\, g(t,t)| + sup_t|g(t,0)|,\ t \in I\}$.

(v) For all $t_1, t_2 \in I$ such that $t_1 < t_2$ the functions $s \to g(t_2,s) - g(t_1,s)$ are nondecreasingon I.

(vi) $g(0,s) = 0$ for any $s \in I$.

Remark 1. Observe that assumptions (v) and (vi) imply that the function $s \to g(t,s)$ isnondecreasing on the interval I, for any fixed $t \in I$ (Remark 1 in [6]). Indeed, putting$t_2 = t,\ t_1 = 0$ in (v) and keeping in mind (vi), we obtain the desired conclusion. From this observation,it follows immediately that, for every $t \in I$, the function $s \to g(t,s)$ is of bounded variation on I.

Definition 2. By a weak solution to (2) we mean a function $x \in C[I,E]$which satisfiesthe integral equation (2). This is equivalent to finding $x \in C[I,E]$ with

$$\varphi\big(x(t)\big) = \varphi(a(t) + \lambda \int_0^t f\Big(s, x\big(\psi(s)\big), y\big(\,\omega(s)\big)\Big)\, d_s g(t,s)), \qquad t \in I\,,$$
$\forall \varphi \in E^*$. (3)

Theorem 2. Under the assumptions (i)−(vi), the Riemann−Stieltjes integralequation (2) has at least one weak solution $x \in C[I,E]$.

Proof. Define the operator A by

$$Ax(t) = a(t) + \lambda \int_0^t f\Big(s, x\big(\psi(s)\big), y\big(\,\omega(s)\Big)\, d_s g(t,s), \qquad t \in I.$$

For every $x \in C[I,E], f(.,\ x(.), y(.))$ is weakly–weaklycontinuous on I, then $\varphi(f(\,s, x(s), y(s)))$ is continuous for every $\varphi \in E^*, g$ is of boundedvariation. Hence$f(\,s, x(s), y(\,\omega(s)))$ is weakly Riemann–Stieltjes integrable on I with respectto $s \to g(t,s)$. Thus A makes sense.

Now, define the set $Q_r$by

$$Q_r = \{x, y \in C[I,E] : \max\{\|x\|, \|y\|\} \le r,\ r = \frac{\|a\|+|\lambda| M\mu}{1-b\mu}\}$$

The remainder of the proof will be given in four steps.

Firstly, we will prove that the operator A maps $C[I,E]$ into $C[I,E]$.

Let $\epsilon > 0,\ t_1, t_2 \in I,\ t_2 > t_1$, and $t_2 - t_1 < \epsilon$, without loss of generality, assumethat $Ax(t_2) - Ax(t_1) \neq 0$.

$$\|Ax(t_2) - Ax(t_1)\| \le \left|\varphi\big(a(t_2) - a(t_1)\big)\right| + |\lambda| \left| \int_0^{t_2} \varphi\Big(f\Big(s, x\big(\psi(s)\big), y\big(\,\omega(s)\big)\Big)\Big)\, d_s\, g(t_2, s) - \int_0^{t_1} \varphi\Big(f\Big(s, x\big(\psi(s)\big), y\big(\,\omega(s)\big)\Big)\Big)\, d_s\, g(t_1, s) \right|$$

$$\le \|a(t_2) - a(t_1)\| + |\lambda| \left| \int_0^{t_2} \varphi\Big(f\Big(s, x\big(\psi(s)\big), y\big(\,\omega(s)\big)\Big)\Big)\, d_s\, g(t_2, s) - \int_0^{t_1} \varphi\Big(f\Big(s, x\big(\psi(s)\big), y\big(\,\omega(s)\big)\Big)\Big)\, d_s\, g(t_2, s) \right|$$
$$+ |\lambda| \left| \int_0^{t_1} \varphi\Big(f\Big(s, x\big(\psi(s)\big), y\big(\,\omega(s)\big)\Big)\Big)\, d_s\, g(t_2, s) - \int_0^{t_1} \varphi\Big(f\Big(s, x\big(\psi(s)\big), y\big(\,\omega(s)\big)\Big)\Big)\, d_s\, g(t_1, s) \right|$$

$$\leq \|a(t_2) - a(t_1)\|$$
$$+|\lambda| \int_{t_1}^{t_2} \left|\varphi(f\left(s,,x\big(\psi(s)\big),y(\ \omega(s))\right)\right| d_s\left(\bigvee_{z=0}^{s} g(t_2,z)\right)$$
$$+\ |\lambda| \int_{0}^{t_1} \left|\varphi\left(f\left(s,x\big(\psi(s)\big),y(\ \omega(s))\right)\right)\right| d_s\left(\bigvee_{z=0}^{s}[g(t_2,z)\right.$$
$$\left. - g(t_1,z)]\right)$$

$$\leq \|a(t_2) - a(t_2)\| + |\lambda|\|f(s,x,y)\| \int_{t_1}^{t_2} d_s g(t_2,s)$$
$$+\ |\lambda| \int_{0}^{t_1} \|f(s,,x,y)\| d_s[g\ (t_2,s) - g\ (t_1,s)]$$

$$\leq \|a(t_2) - a(t_2)\| +\ |\lambda|\|f(s,x,y)\|[g\ (t_2,t_2) - g\ (t_2,t_1)]$$
$$+|\lambda| \int_{0}^{t_1} m(s)\, d_s[g\ (t_2,s) - g(t_1,s)]$$
$$+\ |\lambda| \int_{0}^{t_1} b \max\{\|x\|,\|y\|\}\, d_s[g\ (t_2,s) - g(t_1,s)]$$

$$\leq \|a(t_2) - a(t_2)\| + |\lambda|\|f(s,x,y)\|[g\ (t_2,t_2) - g\ (t_2,t_1)]$$
$$+|\lambda|M \int_{0}^{t_1} d_s[g\ (t_2,s) - g(t_1,s)] +\ |\lambda| br \int_{0}^{t_1} d_s[g\ (t_2,s) - g(t_1,s)]$$

$$\leq \|a(t_2) - a(t_2)\| + |\lambda|\|f(s,x,y)\|[g\ (t_2,t_2) - g\ (t_2,t_1)]$$
$$+(M + br)|\lambda|\big[\big(g(t_2,t_1) - g_1(t_1,t_1)\big) - g(t_2,0) - g_1(t_1,0)\big].$$

Hence

$$\|Ax(t_2) - Ax(t_1)\| \leq$$
$$\leq \|a(t_2) - a(t_2)\| + |\lambda| \|f(s,x,y)\| [g\ (t_2,t_2) - g\ (t_2,t_1)]$$
$$+(M+br)|\lambda| \big[\big(g(t_2,t_1) - g_1(t_1,t_1)\big) - g(t_2,0) - g_1(t_1,0)\big].$$

then from the continuity of the function g assumption (iv) we deduce that A maps $C[I,E]$ into $C[I,E]$.

Secondly, we will prove that the operator A maps $Q_r$into Q_r.

Take $x \in Q_r$, without loss of generality assume $Ax \neq 0, t \in I$. By proposition 2, we have

$$\|Ax(t)\| = \varphi(Ax(t))$$
$$\leq |\varphi(a(t))| + |\lambda| \left|\varphi\left(\int_0^t f\left(s, x(\psi(s)), y(\ \omega(s))\right)\right) d_s g(t,s)\right|$$
$$\leq \|a\| + |\lambda| \int_0^t \left|\varphi(f\left(s, x(\psi(s)), y(\ \omega(s))\right))\right| d_s \left(\bigvee_{z=0}^{s} g(t,z)\right)$$
$$\leq \|a\| + |\lambda| \int_0^t \|f(s,x,y)\| d_s \left(\bigvee_{z=0}^{s} g_1(t,z)\right)$$

$$\leq \|a\| + |\lambda| \int_0^t (m(s) + b\ \max\{\|x\|, \|y\|\})\ d_s \left(\bigvee_{z=0}^{s} g(t,z)\right)$$
$$\leq \|a\| + (\mathrm{M} + br)|\lambda| \int_0^{\mathrm{t}} d_s g(t,s)$$

$\leq \|a\| +(\mathrm{M}+br)|\lambda|[g(t,t) - g(t,0)]$

$$\leq \|a\| + (\mathrm{M} + br)|\lambda|[\sup_{\mathrm{t}\in\mathrm{I}}|g(\mathrm{t},\mathrm{t})| + \sup_{\mathrm{t}\in\mathrm{I}}|g(\mathrm{t},0)|]$$

$$\leq \|a\| + (\mathrm{M} + br)|\lambda|\ \mu.$$

Then

$$\|Ax(t)\| \leq \|a\| + (\mathrm{M} + br)|\lambda|\ \mu.$$

Hence $Ax \in Q_r$which prove that $A : Q_r \to Q_r$and $AQ_r$is bounded in $C[I,E]$.

Thirdly, we will prove that $AQ_r(t)$ is relatively weakly compact in E.

Note that $Q_r$is nonempty, uniformly bounded and strongly equi−continuous subset of$C[I,E]$, by the uniform boundedness of AQ_r, according to propositions 1, $AQ_r$is relatively weakly compact.

Finally, we will prove that the operator A is weakly sequentially continuous.

Let $\{x_n(\psi(t))\}, \{y_n(\omega(t))\}$are sequences in $Q_r$weakly convergent to $x(\psi(t)), y(\omega(t))$ in E, since $Q_r$isclosed we have $x \in Q_r$. Fix $s \in I$, since f satisfies (1)−(2), then we have $f(s, x_n(\psi(s)), y_n(\omega(s)))$converges weakly to$f(s, x(\psi(s)), y(\omega(s)))$. Furthermore, $(\forall\ \varphi \in E^*)$ $\varphi(f(s, x_n(\psi(s)), y_n(\omega(s))))$ convergence strongly to $\varphi(f(s, x(\psi(s)), y(\omega(s))))$.

Applying Lebesgue dominated convergence theorem.

$$\varphi\left(\int_0^t f\left(s, x_n(\psi(s)), y_n(\omega(s))\right) d_s g(t,s)\right)$$
$$= \int_0^t \varphi\left(f\left(s, x_n(\psi(s)), y_n(\omega(s))\right)\right) d_s g(t,s)$$
$$\to \int_0^t \varphi\left(f\left(s, x(\psi(s)), y(\omega(s))\right)\right) d_s g(t,s), \quad \forall\, \varphi \in E^*, \; s \in I.$$

i.e. $\varphi(Ax_n(t)) \to \varphi(Ax(t)), \forall\, t \in I, Ax_n(t)$ converging weakly to $Ax(t)$ in E.

Thus, A is weakly sequentially continuous on Q_r.

Since all conditions of Theorem 1 are satisfied, then the operator A has at least one fixed point $x \in Q_r$and the Riemann−Stieltjes integral equation (2) has at least one weaksolution.

3 The weak maximal and weak minimal solutions

Now we give the following definition

Definition 4. Let $q(t)$ be a weak solution of (2) Then $q(t)$ is said to be a weak maximalsolution of (2) if every weak solution $x(t)$of (2) satisfies the inequality

$$\varphi(x(t)) < \varphi(q(t)), \; \forall\, \varphi \in E^*.$$

A weak minimal solution $s(t)$can be defined by similar way by reversing the above inequality

i.e.

$$\varphi\big(x(t)\big) > \varphi\big(s(t)\big), \ \forall \varphi \in E^*.$$

In this section f assumed to satisfy the following assumption:

(4) for any $x, y, p, p^* \in E$ satisfying $\varphi(x(t)) < \varphi(p(t))$, and $\varphi\big(y(t)\big) < \varphi\big(p^*(t)\big)$, $\forall \varphi \in E^*$implies that

$$\varphi\Big(f\Big(s, x\big(\psi(s)\big), y\big(\omega(s)\big)\Big)\Big) < \varphi\Big(f\Big(s, p\big(\psi(s)\big), p^*\big(\omega(s)\big)\Big)\Big).$$

Lemma 1. Let $f(s, x, y)$satisfies assumptions of Theorem (2) and let $x(t), p(t) \in C[I, E]$on Isatisfying

$$\varphi\big(x(t)\big) \le \varphi(a(t)) + \int_0^t \varphi(f\Big(s, x\big(\psi(s)\big), y\big(\omega(s)\big)\Big))\, d_s g(t,s),$$

$$\varphi\big(p(t)\big) \ge \varphi(a(t)) + \int_0^t \varphi(f\Big(s, x\big(\psi(s)\big), y\big(\omega(s)\big)\Big))\, d_s g(t,s),$$

for all $\varphi \in E^*$, where one of them is strict.

If $f(s, x, y)$ satisfies assumption (4). Then

$$\varphi(x(t)) < \varphi\big(p(t)\big).$$

Proof: Let the conclusion (4) be false, then there exists $t_1$such that

$$\varphi\big(x(t_1)\big) = \varphi\big(p(t_1)\big), \qquad t_1 > 0$$

and

$\varphi(x(t)) < \varphi\big(p(t)\big), \;\; 0 < t < t_1.$

Since $f(\,s, x, y)$ satisfies assumption (4), we get

$$\varphi\big(x(t_1)\big) \leq \varphi(a(t_1)) + \int_0^{t_1} \varphi(f\left(, s, x\big(\psi(s)\big), y(\,\omega(s))\right))\, d_s g(t_1, s),$$

$$< \varphi\big(a(t_1)\big) + \int_0^{t_1} \varphi(f\left(s, p\big(\psi(s)\big), p^*(\,\omega(s))\right))\, d_s g(t_1, s),$$

$$< \varphi\big(p(t_1)\big).$$

Which contradicts the fact that$\varphi\big(x(t_1)\big) = \varphi\big(p(t_1)\big)$, then

$$\varphi(x(t)) < \varphi\big(p(t)\big).$$

Theorem 4. Let the assumptions of Theorem (2) be satisfied. If $f(s, x, y)$ satisfies assumption (4), then there exist a weak maximal and weak minimal solutions of (2).

Proof: Firstly we shall prove the existence of the weak maximal solution of (2). Let $\epsilon > 0$ be given. Now consider the integral equation

$$x_\epsilon(t) = a(t) + \int_0^t f_\epsilon\left(s, x_\epsilon(\psi(s)), y_\epsilon(\omega(s))\right) d_s g(t,s)), \quad (4)$$

where

$$f_\epsilon(s, x_\epsilon(s), y_\epsilon(s)) = f\left(s, x_\epsilon(\psi(s)), y_\epsilon(\omega(s))\right) + \epsilon.$$

Clearly the function $f_\epsilon(s, x_\epsilon, y_\epsilon)$ satisfies the conditions (1)− (3) of Theorem (2) and

$$\begin{aligned} \|f_\epsilon(s, x_\epsilon, y_\epsilon)\| &\le m(s) + b \max\{\|x\|, \|y\|\} + \epsilon \\ &= m(s) + b \max\{\|x\|, \|y\|\}. \end{aligned}$$

Therefore equation (4) has a weak solution $x_\epsilon \in C[I, E]$ according to Theorem (2). Let ϵ_1 and ϵ_2 be such that $0 < \epsilon_2 < \epsilon_1 < \epsilon$. Then

$$x_{\epsilon_1}(t) = a(t) + \int_0^t f_{\epsilon_1}\left(s, x_{\epsilon_1}(\psi(s)), y_{\epsilon_1}(\omega(s))\right) d_s g(t,s)),$$

$$x_{\epsilon_1}(t) = a(t) + \int_0^t f\left(s, x_{\epsilon_1}(\psi(s)), y_{\epsilon_1}(\omega(s))\right) + \epsilon_1\, d_s g(t,s)),$$

implies that

$\varphi(x_{\epsilon_1}(t)) >$
$\varphi(a(t)) + \int_0^t \varphi(f\left(s, x_{\epsilon_1}(\psi(s)), y_{\epsilon_1}(\omega(s))\right)) + \epsilon_2\ d_s g(t,s)),$
(5)

$\varphi(x_{\epsilon_2}(t)) =$
$\varphi(a(t)) + \int_0^t \varphi(f\left(s, x_{\epsilon_2}(\psi(s)), y_{\epsilon_2}(\omega(s))\right)) + \epsilon_2\ d_s g(t,s)),$
(6)

Using Lemma (1), then (5) and (6) implies

$$\varphi(x_{\epsilon_2}(t)) < \varphi(x_{\epsilon_1}(t)), \qquad t \in [0,1].$$

As shown before in the proof of Theorem (2) the family of functions $x_\epsilon(t)$defined by(4) is uniformly bounded and of strongly equi−continuous functions. Hence by Arzela−Ascoli Theorem, there exists a decreasing sequence $\epsilon_n$such that $\epsilon \to 0$ as $n \to 1$ and$lim_{n\to\infty} x_{\epsilon_n}(t)$ exists uniformly in $[0,1]$ and denote this limit by $q(t)$, from the weaklycontinuity of the function $f_{1\epsilon_n}$and applying Lebesgue Dominated Convergence Theorem,we get

$$q(t) = \lim_{n\to\infty} x_{\epsilon_n} = a(t) + \int_0^t f\left(s, q(\psi(s)), q^*(\omega(s))\right) d_s g(t,s).$$

which proves that q(t) as a solution of (2).

Finally, we shall show that $q(t)$ is the weak maximal solution of (2). To do this, let $x(t)$ beany weak solution of (2). Then

$$\varphi(x_\epsilon(t)) = \varphi(a(t)) + \int_0^t \varphi(f\left(s, x_\epsilon(\psi(s)), y_\epsilon(\omega(s))\right)) + \epsilon \ d_s g(t,s)),$$

$$> \varphi(a(t) + \int_0^t \varphi(f\left(s, x_\epsilon(\psi(s)), y_\epsilon(\omega(s))\right)) d_s g(t,s)),$$

and

$$\varphi(x(t)) = \varphi(a(t)) + \int_0^t \varphi(f\left(s, x(\psi(s)), y(\omega(s))\right)) \ d_s g(t,s)),$$

applying Lemma (1), we get

$$\varphi(x_\epsilon(t)) > \varphi(x(t))$$

from the uniqueness of the maximal solution (see [11]), it is clear that $x_\epsilon(t)$ tends to $q(t)$uniformly in $t \in [0,1]$ as $\epsilon \to 0$.

By similar way as done above we can prove that $s(t)$ is the weak minimal solution of (2).

In what follows, we provide some examples illustrating the above obtained results.

Example 1: Consider the function $g : I \times I \rightarrow R$defined by the formula

$$g(t,s) = t^3 + ts, \; t \in I.$$

It can be easily seen that the function $g(t,s)$ satisfy assumptions (iv)−(vi) given in Theorem2. In this case, the Riemann−Stieltjes functional integral equation (2) has the form

$$x(t) = a(t) + \int_0^t tf\big(s, x\big(\psi(s)\big), y(\,\omega(s))\big)ds, \quad t \in I$$
(10)

Therefore, the equation (10) has at least one weak solution $x \in C[I,E]$, if the functionsa, λ and f satisfy the assumptions (i)−(iii).

Example 2: Consider the function $g : I \times I \rightarrow R$defined by the formula

$$g(t,s) = \begin{cases} t\, lin\dfrac{t+s}{t}, & for \;\; t \in (0,1], \quad s \in I, \\ 0, & for \;\; t = 0, \;\; s \in I. \end{cases}$$

Also, the function $g(t,s)$ satisfy assumptions (iv)−(vi) given in Theorem 2. In this case, theRiemann−Stieltjes integral equation (2) has the form

$$x(t) = a(t) + \lambda \int_0^t \frac{t}{t+s} f\left(s, x(\psi(s)), y(\omega(s))\right) ds, \quad t \in I.$$
(11)

Therefore, the equation (11) has at least one weak solution $x \in C[I, E]$, if the functionsa, λ and f satisfy the assumptions (i)−(iii).

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An Evaluation of the Difficulties and Problems of Study English Language : The Case Study Students of Suleiman Al farise Secondary School

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تقيم الصعوبات والمشاكل التي توجه طلاب المرحلة الثانوية في د راسة اللغة الانجيزية دراسة حالة : طلاب مدرسة سلمان الفارسي الثانوية

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الملخص :

تهدف الدراسة الي تقيم صعوبات ومشاكل التي يواجهها طلبة اللغة الانجليزية في مرحلة الثانوية "دراسة حالة : مدرسة سلمان الفارسي الثانوية – السودان" . تهدف الدراسة ايضاً لاستكشاف اسباب الصعوبات والمشاكل . استخدم الباحث المنهج التجريبي لبيان و قياس صعوبات التحدث و الكتابة التي يواجهها طلاب اللغة الانجليزية في المرحلة الثانوية . قام الباحث بتصميم مقابلة سيتم تطبيقها علي عينة الدراسة . و سيتم تطبيق هده المقابلة على كل طالب لتحقق في صعوبات التحدث و الكتابة . اظهرت النتائج وجود بعض الصعوبات في حديث والكتابة . تبنت الباحثة بعض التوصيات اهمها انشاء بيئة داعمة و تشجيع الطلاب على التحدث باللغة الانجليزية بشكل متكرر و اقترح اجراء المزيد من الابحاث فيما يتعلق بصعوبات التحدث و الكتابة باللغة الانجليزية و تدريب المعلمين وتأهلهم للعملية العلمية .

Abstract

The study aims to an evaluation the difficulties and problems faced students of English Language at the secondary school stage " a case study of Suleiman Al–Farsie Secondary School – in Sudan ". The study also aims to explore the causes of difficulties and problems. The researcher used the experimental method to show and measure the speaking and writing difficulties that English language students face in the secondary school . The researcher designed an interview that will be

applied to the study sample. And this interview will be applied to each student to investigate the difficulties of speaking and writing. The results showed that there are some difficulties in speaking and writing.

The researcher adopted some recommendations, the most important of which is creating a supportive environment and encouraging students to speak English frequently. I suggested conducting more research regarding the difficulties of speaking , writing in English and teachers will give training in English language to qualifying them for the scientific process.

1.0Introduction

English language education in the Sudan has a long and rich history. The beginning of this history dates back to the start of the Anglo-Egyptian rule (1889 -1956). According to Sandell (1982:5), "the administration of British rule had begun and with it the English language found a foothold in an alien land dominated by Arabic and Islam." The British administration in the Sudan at that time had very specific o Subjectives in relation to English language education. The primary aim was to have local civil servants who can successfully operate the system of civil service. With these focused goals in mind, the administration established schools and colleges which provided the amount of study necessary to produce the required cadre. English language was the main medium of instruction in those institutions (Sandell, 1982:6).

A point in the history of education in the Sudan, which is quite a landmark, was the establishment of Bakht er Ruha Institute in 1934. This historic milestone marked a new era for teacher education and teacher training. This impact of this development on English language education in the Sudan started to be clear when the Teacher Training section was added to Bakht er Ruda (Sandell, 1982: 29).

After the Sudan gained independence, the national governments kept the trend of giving English language education its due attention. This was done through their educational policies in general and their language policies in particular. English Language Education continued to keep its prestigious status as English continued to be the medium of instruction in secondary and higher education. However, late in the 1960s, Arabicization took place in Secondary schools and consequently English language lost its status as a medium of instruction and became a school subject. This was further coupled by the policy of Arabicization that took place in higher education in the early 1990s

As far as curricula and syllabus designed are concerned, English language phased in and out of a number of stages. Between the 1950's and the 1990's, a number of English language syllabuses were used. It makes sense here to briefly follow the timeline of English language courses that were used in the Sudan.

1.1 Statement of the problem

Nowadays, there is a constant complaint and discontent about the low standard of English language learners in basic schools. In fact, there are various factors that have contributed to the occurrence of the current situation. There is a general consensus among all stakeholders about the fact that syllabus design is among the major factors which has led to the decline of English language in basic schools.

It goes without saying that syllabus design is not a haphazard task. It is a coherent systematic process which is governed by clear-cut principles, criteria, goals, objectives and educational approaches that must be recognized.

Although the national experts who authored SPINE series were well recognized as experts in English language education; and although they exerted commendable efforts to produce the best quality of materials, it can still be observed that SPINE books which are taught in Basic Level exhibit signs of inconsistency with the science and art of syllabus design. These signs are clear in a number of aspects; but for the limits of space and time of the present study, the focus will be on three areas that are fundamental to syllabus design. These areas are:

(a) Scope and sequence,

(b) Thematic planning

(c) The selection, distribution and recycling of vocabulary.

1.2 Research questions

This study will try to provide answers to the following questions:

1. To what extent does SPINE 3 follow a well constructed 'scope and sequence' chart?
2. To what extent does SPINE 3 adopt the thematic unit planning approach?
3. To what extent does SPINE 3 follow a unit template?
4. To what extent does SPINE 3 adhere to the principle of selection, recycling and even distribution of vocabulary?

1.3 Hypothesis of the study

This study has the following as its hypotheses:

1. SPINE 3 is not designed in accordance with a 'scope and sequence' chart.
2. SPINE 3 does not adopt the thematic unit planning approach.
3. SPINE 3 does not follow a system of unit template.
4. Vocabulary selection, recycling and even distribution in SPINE 3 is weak and defective.

1.4 Objectives of the study

The main objectives of this study are to investigate English language syllabus design mechanism for basic education, so as to identify its strength and weakness. The study attempts to anticipate the major difficulties behind constructing English language syllabi and highlight some conventional principles which may support syllabus designers in designing effective and fruitful English language syllabi which are appropriate to the situation for basic learners and lead to obtain the prescribed goals of teaching English for basic education.

The study aims to explore the main adequate principles and chosen from national and international literature review relevant to the issue of the study. The final out comes of the study will represent a model for English syllabus design which will be adopted by the researcher for solving the problem of applying undisciplined or haphazard syllabus design. Therefore, the study attempts to attain the following objectives:

1. To state and identify the major principles used in designing English language syllabus for non- native speakers.
2. To pinpoint the strong and weak areas of designing English language in SPINE series.
3. To detect the exact factors that may constrain or contribute to decline of English language standard for basic education.
4. To suggest some modified principles for constructing for the basic education English language programmes for future usage.
5. To develop and maintain current strategies, current trends and approaches used in designing English language syllabus for basic education in order to improve the standard teaching and learning English in basic schools.

1.5 Significance of the study

This research is addressed to educators, authors, syllabus designers , and teachers of English language. It is expected to shed light on the fundamentals that should be considered in English syllabus design. The study findings are expected to contribute to developing the process English syllabus for basic education, which will consequently lead to the promotion of English language standard in basic education.

1.6 Limitation of the study

This study has the following limitations::

1. It is limited to basic education English language syllabi especially SPINE 3.
2. It is limited to certain aspects of syllabus design namely

(a) Scope and sequence

(b) Thematic unit planning

(c) Unit template

(d) Vocabulary selection, distribution and recycling.

Methodology

.1 Introduction

This chapter describes the methodology of the study. It presents the different aspects and methods used for the conduction of the study. This includes:

(1) Research design

(2) Population and sampling

(3) Tools used for data analysis

(4) Procedures of data analysis

2 Research design

The study is descriptive in nature. It seeks to describe the 'what' aspect of the problem under investigation. As a descriptive study it will not go into discovering the 'why' aspects of the issue. This design suits the study because it will help draw a clear picture about the way SPINE series was constructed. Consequently, it will serve an important aim of the present study viz. the evaluation of the first ever national attempt to design a series for English language teaching and learning in the Sudan and, in effect, will hopefully inform any other similar attempt.and pave the way for the scientific evaluation for it.

The study will also employ the quantitative approach to the analysis of the data gathered from the document (i.e. SPINE 3). The results of the quantitative analysis (in terms of figures and percentages) will draw as an accurate picture as possible of the phenomenon being explorded.

3 Population and sampling

The population of the study is the whole set of SPINE series. This series is composed of six textbooks:

(1) SPINE One (for Basic Level Grade Five and Grade Six)

(2) SPINE Two (for Basic Level Grade Seven)

(3) SPINE Three (for Basic Level Grade Eight)

(4) SPINE Four (for Secondary Level Grade One)

(5) SPINE Five (for Secondary Level Grade Two)

(6) SPINE Six (for Secondary Level Grade Three)

4 The sample of the study

The sample of the study is SPINE 3. This textbook has been chosen as being representative of the whole series for the following reasons:

(1) It is situated in the middle of the series. The students study SPINE 1 in two years (Grade Five of the Basic Level and Grade Six of the Basic Level) followed by SPINE Two in Grade Seven of the Basic Level. In the Secondary Level, the students study the other three textbooks (SPINE 4, SPINE 5, and SPINE 6). So, there are three years of English language instruction before SPINE 3 and three years of English language instruction after it. In this way, SPINE 3

provides a link between the two levels of general education; Basic Level and Secondary :Level.

(2) There is almost a consensus among teachers and educationists that there is a huge gap between SPINE 2 and SPINE 3 on the one hand and a huge gap between SPINE 3 and SPINE 4 on the other. This makes SPINE 3 a suitable candidate for the investigation of the aspects addressed by the present study in terms of:

(a) Scope and sequence

(b) Thematic unit planning, and

(c) Selection, distribution and recycling of vocabulary.

(3) There is also a prevailing conviction among teachers and educationists that SPINE books for Secondary Level focus mainly on the skill of reading. For obvious reasons, SPINE 1 and SPINE 2 focus mainly on listening, speaking and initial writing. This also stresses the fact that SPINE 3 makes a suitable choice as a sample for the present study because it focuses developing reading skill.

SPINE 3 is composed of six units. The first unit is a revision unit so it is excluded from the analysis because it does not introduce any new vocabulary items. Accordingly, the analysis will cover the remaining units (i.e. from Unit Two up to Unit Six).

Within SPINE 3, two main texts from each unit are chosen for analysis. In order for the texts to be representative of the whole unit, one text will be from the beginning of the unit and the other one will be towards the end of the unit. The texts are as follows:

(1) Unit Two : Lesson 2 and Lesson 9

(2) Unit Three: Lesson 2 and Lesson 9.

(3) Unit Four: Lesson Two and Lesson 9

(4) Unit Four: Lesson 2 and Lesson 9

(5) Unit Six: Lesson 2 and Lesson 9.

The pattern of "Lesson 2 and Lesson 9" is meant for making the randomized sampling process more systematic and hence more representative.

5 Tools used for data analysis

The tools used for the analysis of data are web-based tools. These tools have been specially designed for the purposes of vocabulary analysis and are widely used among researchers in this area. The following online tools will be used for the analysis , this went through the following steps:

Step One

The researcher compiled the word list of SPINE 1 directly from the book itself; page by page, line by line , and word by word. It is to be noted that the words that appear in the instruction are not included in the lists. Only the words in the texts are listed. The list was arranged in alphabetical order

Step Two

The same process was applied to SPINE 2.

Step Three

The two lists (List of SPINE1 and List of SPINE) were unified in one list (see appendix One).

Step Four

Any words that are repeated were deleted.

So, the result is a list of all the new words in SPINE 1 and SPINE 2. This list represent the baseline of the study. It is used later in producing the list of the new words in SPINE 3.

6 Compiling the list of new words in SPINE 3

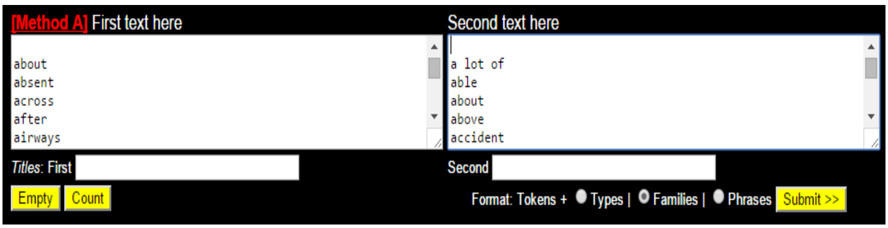
Now that the baseline vocabulary of SPINE series is made ready, it is used for compiling the list of new words in SPINE 3. This went as follows:

Step One

The researcher made a list of all the words in SPINE 3; page by page, line by line, and word by word.

Step Two

The list in step one above is a crude list. It contains words from SPINE 1 and from SPINE 2. These words have to be filtered out so that the list contains only the new words in SPINE 3. So, the researcher used



Secondly, the 'submit' button is clicked. The following window appears

Unique to first	Shared	Unique to second	
338 tokens	804 tokens	801 tokens	
181 families	541 families	709 families	VP novel items
001. nine 7	001. up 9	Freq first	Same list
002. eight 6	002. get 8	(then alpha)	Alpha first
003. six 6	003. in 8	001. free 5	001. able 1
004. feather 4	004. out 8	002. africa 3	002. above 1
005. loud 4	005. ocean 7	003. agent 3	003. accident 1
006. type 4	006. the 6	004. agree 3	004. active 1
007. worse 4	007. travel 6	005. brave 3	005. add 1
008. eleven 3	008. drive 5	006. city 3	006. address 1
009. leaf 3	009. go 5	007. engine 3	007. adjective 1
010. mango 3	010. nile 5	008. health 3	008. adult 1
011. twelve 3	011. of 5	009. india 3	009. advance 1
012. absent 2	012. off 5	010. prevent 3	010. adventure 1
013. airway 2	013. on 5	011. sail 3	011. advise 1
014. appear 2	014. take 5	012. serve 3	012. aeroplane 1
015. bald 2	015. turn 5	013. trade 3	013. afraid 1
016. basket 2	016. away 4	014. agriculture 2	014. africa 3
017. bee 2	017. be 4	015. air 2	015. again 1

The words in column one are the words in the unified list of SPINE 1 and SPINE 2.

The words in the column two are the words that are shared between the two lists; the unified list of the first two books and the crude list of SPINE 2.

The words in column three are the new words in SPINE 3.

Thirdly, the list of words in column three is highlighted and copied.

The first tool works as follows:

Step One

Insert the word list of SPINE 3

Step Two

Click the button "SUBMIT_Window". The following window appears

	Families	Types	Tokens	Percent
K1 Words (1-1000):	638	752	**909**	**56.71%**
Function:	...	...	(155)	(9.67%)
Content:	...	...	(754)	(47.04%)
> Anglo-Sax =Not Greco-Lat/Fr Cog:	...	...	(416)	(25.95%)
K2 Words (1001-2000):	318	348	**384**	**23.96%**
> Anglo-Sax:	...	...	(203)	(12.66%)
1k+2k			...	(80.67%)
AWL Words (academic):	33	34	**37**	**2.31%**
> Anglo-Sax:	...	...	(3)	(0.19%)
Off-List Words:	?	257	**273**	**17.03%**
	989+?	1391	1603	100%

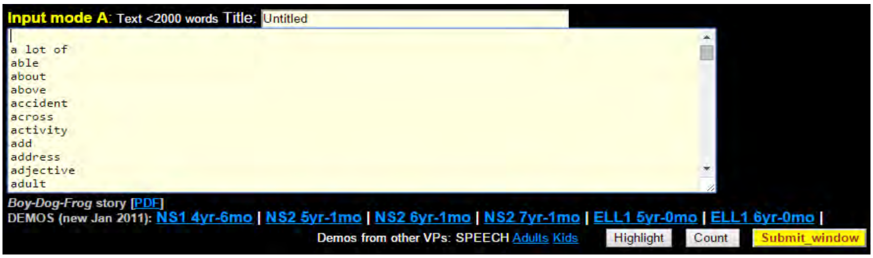
A simpler window can be viewed

	Families	Types	Tokens	Percent
K1 Words (1-1000):	638	752	909	56.71%
Function:	...	...	(155)	(9.67%)
Content:	...	...	(754)	(47.04%)
> Anglo-Sax =Not Greco-Lat/Fr Cog:	...	...	(416)	(25.95%)
K2 Words (1001-2000):	318	348	384	23.96%
> Anglo-Sax:	...	...	(203)	(12.66%)
1k+2k		...	...	(80.67%)
AWL Words (academic):	33	34	37	2.31%
> Anglo-Sax:	...	...	(3)	(0.19%)
Off-List Words:	?	257	273	17.03%
	989+?	1391	1603	100%

The second tool works as follows

Step One

Insert the word list



Step Two

Click the 'Submit_window' button. The following window appears

Freq. Level	Families	Types	Tokens	Coverage%	Cum%
Kid250 - 1:	167	223	329	20.59	20.59%
Kid250 - 2:	149	163	182	11.39	31.98%
Kid250 - 3:	122	133	149	9.32	41.30%
Kid250 - 4:	96	106	115	7.20	48.50%
Kid250 - 5:	71	79	95	5.94	54.44%
Kid250 - 6:	65	73	79	4.94	59.38%
Kid250 - 7:	55	61	66	4.13	63.51%
Kid250 - 8:	48	52	54	3.38	66.89%
Kid250 - 9:	48	57	62	3.88	70.77%
Kid250 - 10:	44	45	47	2.94	73.71%
Off-List known:	345	356	371	23.22	96.93%
Off-List unknown:	?	43	49	3.07	100.00%
Total	1210+?	1391	1598	100%	100%

Also, a simpler window can be viewed

7 Readability

The readability indexes are calculated by the online tool

Step One

Insert the text

Step Two

Click the "Process text" button. The following window appears

Indication of the number of years of formal education that a person requires in order to easily understand the text on the first reading	
Gunning Fog index :	8.65

Approximate representation of the U.S. grade level needed to comprehend the text :	
Coleman Liau index :	6.22
Flesch Kincaid Grade level :	5.68
ARI (Automated Readability Index) :	3.65
SMOG :	9.12

Flesch Reading Ease : 72.63

List of sentences which we suggest you should consider to rewrite to improve readability of the text :

- They were using different kinds of transport: lorries,buses, cars and even camels.
- On the way to the park he saw many people travelling in the same direction .
- Visitors cannot walk in the park because some animals are dangerous.
- The animals are not in cages ; they move freely among the trees.

Step Three

The average of three indexes is calculated

Coleman Liau index :	6.22
Flesch Kincaid Grade level :	5.68
SMOG :	9.12
Total	21.02

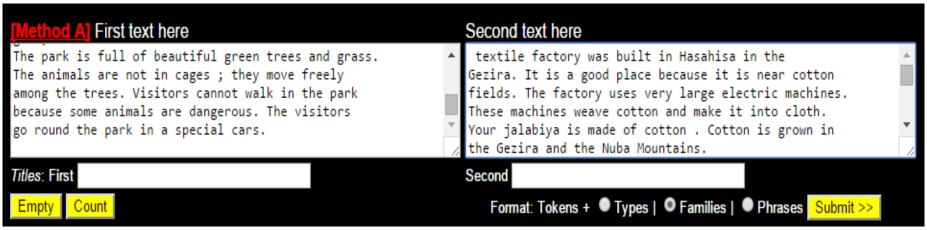
Average : 7.0

8 Recycling of vocabulary

For Recycling of vocabulary, the following online tool is used

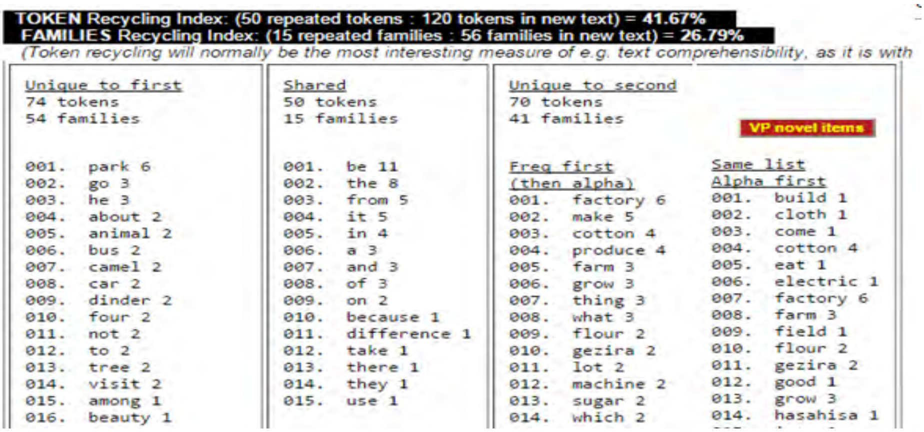
Step One

Insert the texts



Sep Two

Click 'Submit'



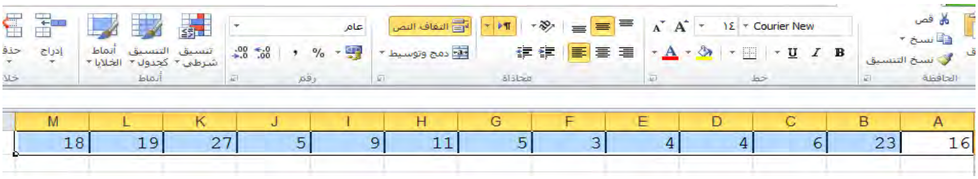
The words in column two are the ones that are recycled.

9- Vocabulary distribution

Excel is used for this.

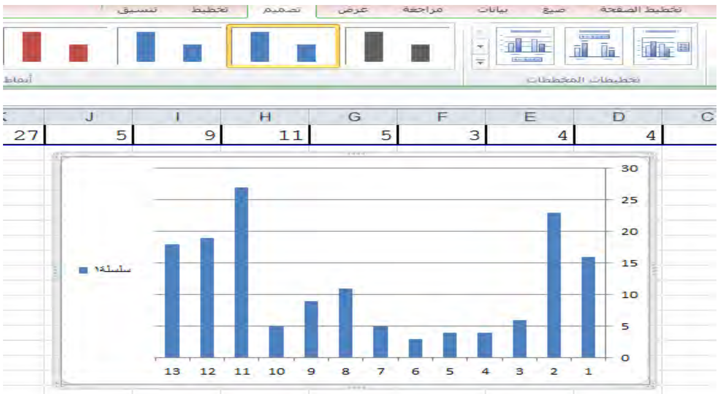
Step One

Insert the number of words in each lesson.



Step Two

Choose graph



10- Summary

This chapter presented the methodology adopted for the present study. It explained the basic issues of population and sampling. It detailed the rigorous process that have been conducted for the analysis of the data.

Conclusions and Recommendations

1. Introduction

This chapter pulls the threads of the study together. It uses the results of the data analysis and discussion in Chapter Four to answer the research questions and verify the hypotheses. It also makes some recommendations and suggests some topics for further research.

2. Answers to the questions and verification of hypotheses

The data from the previous chapter will be used to provide answers for the questions of the study and to verify the hypotheses.

3. Question one and hypothesis one

- To what extent does SPINE 3 follow a well-constructed 'scope and sequence' chart in relation to vocabulary?
- SPINE 3 is not designed in accordance with a 'scope and sequence' chart.

The table (4.1) shows that

(1) 339 content words (40.60%) fall within the range of the first 1000 words in the GSL.

(2) 220 words (26.35%) fall within the range of the second 1000 words in the GSL.

(3) 222 words (26.59%) are off-list.

The table below shows a more detailed description of the word frequency of SPINE 3.

Also, table (4.2) shows that

(1) Only 153 words fall in the range between (250 – 750)

(2) 672 words are beyond the first 750 words of the GSL.

Accordingly it can be concluded that the majority of the words of SPINE 3 (52.94%) fall out of the first 750 words of the GSL.

So, the conclusion is that SPINE 3 does not follow a well-constructed scope and sequence map that depends on the acknowledged GSL. This is supported by the summary of readability indexes in table (4.13) which shows a very high average of readability index, which means that the texts are very difficult to read for the students of SPINE 3.

Consequently, the answer to question one is that SPINE 3 lacks conformity with principles of scope and sequence. In addition, the first hypothesis that "SPINE 3 is not designed in accordance with a 'scope and sequence' chart" is verified.

4. Question two and hypothesis two

- To what extent does SPINE 3 adopt the thematic unit planning approach?
- SPINE 3 does not adopt the thematic unit planning approach.

Tables (4.14) to (3.18) shows that SPINE 3 does not follow the principle of thematic unit planning.

So, the answer to question two is that SPINE 3 does adopt the principle of thematic unit planning. Accordingly, hypothesis two is accepted.

5. Question three and hypothesis three

- To what extent does SPINE 3 follow a unit template?
- SPINE 3 does not follow a system of unit template.

As has been discussed in section (4.4); and based on the findings of section (5.2.2) above, the result is that SPINE 3 does not follow a unit template.

So, the answer to question three is that SPINE 3 has no system of unit template. In addition, hypothesis three is accepted.

6- Question four and hypothesis four

- To what extent does SPINE 3 adhere to the principle of selection, recycling and even distribution of vocabulary?
- Vocabulary selection, recycling and even distribution in SPINE 3 is weak and defective

Section (4.5.1) show that huge number of SPINE 3 vocabulary (672 words) fall beyond the first 750 words in the GSL.This is a clear indication that SPINE 3 vocabulary was not selected according to the level of the students.

The figures (4.1) to (4.5) show that

(a) the new words in SPINE is not evenly spread across the lessons of the units and,

(b) the vocabulary burden is extremely heavy.

Section (4.5.3) show that the new words in SPINE 3 are not properly recycled. In three out of five units, the recycled words range between 0 and 6. This does not indicate that the aspect of recycling of new words received the attention it is worth.

Accordingly, the answer to question four is that SPINE 3 does not adhere to the principle of selection, recycling and distribution of new words. Based on this answer, hypothesis for is accepted.

According to the sections (5.2.1) to (5.2.4) above, all questions are answered in accordance with accepted hypothses.

7. Recommendations

Based on the above, the present study makes the following recommendations:

- Any attempt to write English language textbooks for general education has to follow the scientific approaches to syllabus design and textbook writing.
- National authors of English language textbooks should have intensive practice in the theory and practice of writing and evaluating language textbooks.
- Any new English language national textbooks have to be written in accordance with most up to date approaches.
- English language textbooks constructed by national experts have to undergo rigours analysis in all aspects of syllabus design.

8. Suggestions for further research

Throughout the conduction of this study, the research felt that the following areas need to be evaluated, whether in SPINE series or in any new series:

- Scope and sequence of grammatical structures.

- Investigation of vocabulary, grammar and topics of other skills (listening, speaking and writing).
- Gradation of tasks and activities in textbooks.
- Systematic development of micro skills

9. Summary

This chapter drew the conclusions of the study by providing answers to the four research questions and by verifying the four hypotheses. All four questions have been answered properly and all four hypotheses have been accepted. Based on this, the study made some recommendations and suggested areas for further research.

1. The first cause that makes the students difficult in speaking English is that the environment does not support the students to speak English frequently.

2 . The second solution is for the students themselves. They can have an English conversation club that consists of their own classroom. They can share and talk about anything in English during that time. In this club , they can learn together. Students can correct each other without feeling embarrassed.

3 . Lectures should create a comfortable environment by strengthening the confidence of English Language Learning.

4 . Lectures should not try to correct the local errors of students when they struggle to get their meaning across. Instructor can also speak to the students privately to eliminate any embarrassment.

5 . Lecture should not insist on the errors of the student while they are speaking.

6 . Lecture should create a suitable and friendly environment while they are speaking.

7 . The lectures should encourage all students to speak with them in English.

Suggestion: The researcher suggested carrying out more studies and researches about speaking difficulties encountered by English language students.

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Cloud Computing Security

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الملخص :

يتطلب استخدام التقنيات في العالم الرقمي حالة موثوقة وآمنة، ويجب وضع في عين الاعتبارالتحديات الكاملة التي تواجهها التقنيات الرقمية وتتصدى لها. تعد الحوسبة السحابية واحدة من أحدث التطورات في تكنولوجيا المعلومات علمستوى العالم ،وهي ليست محصنة ضد هذه التحديات الامنية كما أشارت الدراسات التي أجريت .إن أحد التحديات الكبيرة لتكنولوجيا المعلومات هو الأمان الذي هو المطلوب لتقديم الخدمات وبناء ثقة زبائن لنقل معلوماتهم إلى السحابة. في هذه الورقة ، سعينا إلى مسح نقاط الضعف وتحديد الأسباب الكامنة وراء نقاط الضعف الأمنية في أجواء السحابة. وجدنا ان الضعف بسبب ميزات الحوسبة السحابية ، مثل قابلية التوسع ومعالجة البيانات الهائلة و بسبب العامل البشري.

الكلمات المفتاحية:- تحديات في الحوسبة السحابية، عيوب الحوسبة السحابية، الامان في الحوسبة السحابية، التهديدات الامنية في الحوسبة السحابية، نقاط الضعف في الحوسبة السحابية.

ABSTRACT

Utilizing new technologies in the digital world requires a reliable and secure condition and regard to the whole challenges that technology counters with them and tackles these challenges. Cloud computing is likewise one of the newest advances in Information Technology (IT) global in this rule there is no special case and it is not immune to these challenges. As indicated by studies conducted one of the considerable challenges of this technology is the security that is required for giving services and making trust in buyers to move their information into the cloud. In this paper, we endeavored to survey vulnerabilities, and identify reasons behind security weaknesses in a cloud ambiance.The weakness due to the features of cloud computing, such as scalability, enormous data processing. In addition, human factor playrole on some of these challenges.

Keywords: Cloud challenges,Disadvantages of cloud computing, Security in Cloud,Security threats,Vulnerabilities in cloud computing

Introduction

Definition Cloud computing is a connotation to demand service over the internet. Cloud computing gives the forthcoming model of web-based, quite adaptable disseminated computing frameworks in which computational assets are offered 'as a favor'. The most generally utilized meaning of the Cloud computing model is presented by NIST (Almorsy, 2016)as "a model for empowering appropriate, on-request mesh access to a divided pool of configurable computing assets (e.g., services, servers, stockpiling, applications, and meshes) that can be swiftly provisioned and discharged with lower administration exertion or service provider interaction .Multitenancy and pliability are two key features of the cloud model. Multi-Tenancy empowers partnership the same resources and services among various inhabitants. Pliability empowers scaling all over resources assigned to a service depending on the current service requests. The two attributes center around enhancing asset usage, cost, and service accessibility.The cloud style has propelled industry and the scholarly community to embrace cloud computing to have a wide range of uses extending from high computationally concentrated applications down to lightweight services. The pattern is likewise appropriate for tiny and medium organizations since it helps to embrace IT without prior interests in infrastructure, programming licenses, and other important prerequisites. In addition, Governments turn out to be more inspired by the potential outcomes of utilizing distributed computing to lessen IT expenses and increment capacities and reachability of their presented services.As indicated by a Gartner review (Almorsy, 2016)on distributed computing incomes, the cloud market will get $206.2B, up from $175.8B in 2018, these incomes infer that cloud computing is a promising stand. Then again, it expands the assailants' enthusiasm for finding existing vulnerabilities in the model. Despite the possible advantages and incomes that could be picked up from the cloud computing model, the model still has a figure of open issues that affect the model reliability and pervasion. Seller secure, elasticity engines, multi-occupancy, isolation, multi-tenancy, data administration, flexibility engines, SLA administration, migration, and cloud security are outstanding open research issues in the cloud computing model. From the cloud buyers' point of view, security is the real worry that hampers the embrace of the cloud computing model (Almorsy, 2016)on the grounds that.

Cloud Computing Service Models

Infrastructure as a Service (IaaS):

The ability provided to the client such as storage, mesh, capacity, systems, and other principal figuring assets.

Stage as a service (PaaS):

PaaS is an environment which allows the client to develop, manage, and deliver applications, and clients can utilize a suite of prebuilt devices to create, tweak and test their very own applications.

Software as a Service (SaaS):

The ability provided to the end-user is to use the provider's applications running on a cloud infrastructure, without demanding to install the applications on the customers' devices.Figure 1 shows service models of cloud computing.

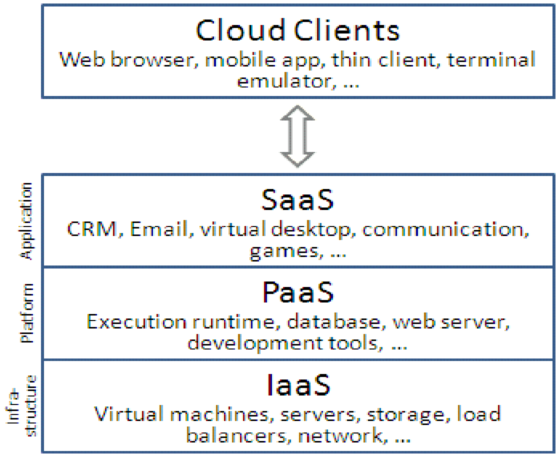

Figure 1: Cloud computing services

Deployment Models

There are four deployment models in cloud computing:

Public Cloud

The cloud foundation is made accessible to the overall population or an industry collection and it is possessed by an association offering cloud services.

Private Cloud

The cloud framework is run by a sole organization. It might be overseen by the organization or an outsider and may found on-premises or off-premises.

Community Cloud

The cloud foundation is shared by various, associations and based on backing a particular network that has shared the same concerns, for example policy, mission, security necessities, and arrangement. It might be overseen by the organizations or an outsider and may found on-premises or off-premises.

Hybrid Cloud

The cloud foundation is an assembly of at least two clouds (community, private, or public)The cloud foundation is an assembly of at least two clouds (community, private, or public) that stay single elements, however, are bound together by exclusive innovation or standardized that empowers information and application flow. Table 1 show a comparison between the types of cloud computing whence features (Rao et al, 2015).

Feature	**Public cloud storage**	**Private cloud storage**	**Hybrid cloud storage**
Scalability	Very high	Finite	Very high
Security	Good	Most secure	Very secure
Performance	Low to medium	Very good	Good.

Reliability	Medium, It depends on the service provider availability and connection to internet.	High, as many of the equipments are within the organization.	Medium to high, as replicated content is kept within enterprises
Cost	Pay-as-you-use	High cost	Pay-as-you-use

Cloud Computing Basic Component

Virtualization: It considers as a vital job in deploying the cloud. It is the vital segment in the cloud, which permits the physical assets by numerous shoppers. It makes the virtual case of the resource or gadgets, for example, storage devices, operating system, servers, capacity gadgets, and network assets wherein the system uses the assets into in excess of one execution environment (Subashini and Kavitha, 2011).

Multi-occupier: Multi-occupier condition can have various users or clients who do not see or offer each other's information, but rather can share asset or application in an execution domain, regardless of whether they may not have a place with a similar association. Multi-tenancy outcomes the ideal use of equipment and information stockpiling instrument (Tan and Ai, 2011).

Cloud storage: It is an ingredient, which preserved, monitored, retrieved, and backed up remotely and is designed to be accessible over the internet where the clients to can get to information (Feng et al., 2011).

The hypervisor: The So called virtual machine screen or director is a key module of virtualization. It permits various Virtual Machines (VMs) to keep running on a solitary equipment host. It oversees and screens the different working frameworks, which keep running in a mutual physical framework (Li et al., 2012).

Cloud Network: It can run in excess of one ordinary data stations that contain hundreds or thousands of servers (Tianfield, 2012).To effectively build and deal with the storages the cloud requires a safe network foundation. It requires a web access and identical with a virtual private system which empowers the client to safely get to printers, applications, and records.**Table 2** Shows the security intimidation and Vulnerabilities (Islam et al, 2016).

Category	**Security threats and Vulnerability**
Security at Network Level	Malware Injection Attack SQL Injection Attack XML Signature Wrapping Attack Insecure Web Applications and APIs
Virtualization Security	Cross VM Side Channel Attack Hypervisor Vulnerabilities Single Point of Failure
Identity and Access Management	Identity Management Authorization & Access Control Authentication
Data and Storage Security	Data Backup and Redundancy Dynamic Data Updates Data Integrity Data Availability
Governance	Improper Data Sanitization Information leakage
Legal and Compliance Issues	Data Location Laws and Regulations Contracts and Electronic Discovery

The Reasons beyond Weakness

- Due to the features of cloud computing, such as scalability, location translucence, and service abstraction, all types of software and data on the cloud stage have no settled framework and security limits. In the case of security breaking, it's hard to insulate a specific physical resource that has been broken (Chen & Zhao, 2012).
- Models, resources, and services in the cloud might are possessed by different suppliers. As there is an irreconcilable interest, it is hard to convey a bound together safety effort;
- As the openness of cloud and participation simulated assets by multi-lessee, client information might be gotten to by other unapproved clients.
- As the cloud stage needs to manage gigantic data storage and to submit a quick access, cloud safety standard needs to meet requirements of enormous data processing (Chen & Zhao, 2012).
- **Insecure interfaces and APIs**: Cloud clients are utilizing programming interfaces and APIs to get to and deal with the cloud services. These APIs should be secured enough because they have a fundamental role in provisioning, administration, coordination, and checking of the procedures running in a cloud ambiance.The security and accessibility of cloud administrations are reliant upon the security of these APIs, so they ought to incorporate features of confirmation, get to control, encryption and movement observing. APIs must be intended to ensure against both incidental and malevolent endeavors to keep away from dangers.When the

provider relies on a feeble group of APIs, an assortment of security issues will be raised identified with confidentiality, integrity, accessibility, and responsibility, for example, noxious or unidentified access, API conditions, constrained observing/logging capacities, unyielding access controls, mysterious access, reusable tokens/passwords and incorrect authorizations (Bamiah&Brohi, 2011).

- **Malicious insider**: Insider assaults can be performed by malignant workers at the supplier's or client's site. Vindictive insider can take the secret information of cloud clients. This danger can break the trust of cloud clients on the supplier. A malevolent insider can undoubtedly acquire passwords, cryptographic keys, and records. These assaults may include different sorts of extortion, harm or burglary of data and abuse of IT assets. The danger of noxious assaults has expanded because of absence of straightforwardness in cloud supplier's procedures and systems (Bamiah&Brohi, 2011).
- **Data loss or leakage**: Information loss can happen because of an operational fiasco, uncertain information stockpiling and conflicting utilization of encryption keys. Operational fiasco alludes to erasure or modification of records without a reinforcement of the first substance that can happen deliberately or undeliberately. Inconsistent information stockpiling alludes to saving information on untrustworthy media that will be unrecoverable if information is lost (Bamiah&Brohi, 2011).
- **Lack of standardization**: A supplier could have the most recent security highlights; however, because of the general absence of

cloud standardization, there are no obvious rules unite cloud suppliers. Further, given the plenty of cloud benefits in various sectors, this is particularly hazardous for clients while deciding precisely how "safe" their cloud truly is (Angeles, 2013).

- **Malware injection:** Malware injections are contents or code inserted into cloud services that go about as "legitimate occurrences" and keep running as SaaS to cloud servers. This means noxious code can be infused into cloud services and saw as a feature of the software or services that are running on the cloud servers themselves (Ma, 2015).
- **Vulnerabilities in internet protocol:** Vulnerabilities in Internet protocols may end up being a certain method for assaulting Cloud framework, that incorporates basic sorts of assaults like DNS harming, flooding, IP spoofing, ARP spoofing, and RIP assaults (Modi et al, 2013).
- **Virtualized technology:** In virtualized conditions; the physical servers run different virtual machines over hypervisors. An aggressor can abuse a hypervisor remotely by utilizing defenselessness introduce in the hypervisor itself such vulnerabilities are very uncommon, yet they do exist. Furthermore, a virtual machine can escape from the virtualized sandbox condition and access the hypervisor and significantly all the virtual machines running on it (Lukan, 2014).

- **Client awareness:** The clients of the cloud services ought to be literate with respect to various assaults, on the grounds that the weakest ring is frequently the client itself (Safonov, 2016).

Cloud Computing Security Concept

In this section, we briefly introduce about the major security concerns of cloud computing.These days, the digital battle is seemingly the most intricate test in a disseminated and multi-inhabitant environmentit is an intricate activity inside the customer-server foundation. At the point when the information travels to the cloud services, the needs of security ought to be the most significant. The European Network Information Security Agency (ENISA) listed the dangers, suggestions and advantages for cloud computing (Somorovsky et al., 2011).In this area, we shortly present the significant security worries of cloud computing.

Software Security

It gives a fundamental thought of programming security originate from the building programming division that it keeps on working effectively under the pernicious exercises. To construct a cloud domain a focal and basic issue is programming security issue. It surrenders with security including execution bugs, cushion flood, structured imperfections, blunder taking care of guarantees and significantly more (Sun et al., 2011).

Infrastructure Security

The most recognized difficulties are to expound that the virtual and physical foundation of the cloud can be trusted.The verification of the third party is not sufficient for the basic business process. It's significant for the association to have the capacity to check business necessities that the fundamental framework is secure.

Storage Security

Storage security: In the cloud storage framework, end client stores the information in the cloud and never again possesses the information and where it's put away. This always has been a vital part of nature, of the service. It guarantees the fidelity of client's data in the cloud and by using a homomorphic token with the dispersed check of deletion-coded information (Nguyen et al., 2015). Storage security worries about data disinfection, cryptography, data-remanence, data spillage, snooping of data accessibility and malware.

Network Security

Since the internet is the backbone of cloud computing and the data swim through a network as a mean. It must be a more secure environment to prevent either internal or external attack; attacks in the network can either come to the virtual or physical network (Wu et al., 2010).

Cloud Security Issues and Challenges

It expounds the various security aspects while creating and developing in cloud computing ambiance.

Embedded Security

The security in embedded frameworks has a few difficulties that caused by the characteristic of these frameworks. The headway of embedded framework is a direct result of enhanced devices working with them. The basic method to investigate an embedded gadget is to interface it to a LAN. An embedded framework linked to universal computing. The primary security issues in cloud computing in embedded frameworks are caused by virtualizations (Zissis and Lekkas, 2012). Embedded security can contain the following aspects:-

- Virtual machine isolation
- VM Monitoring
- Programmability
- Electronic access
- SNMP Server

Application Issues

Security in a production application is the most powerless territory. The vast majority of the applications has a front end, back end, various kinds of platforms, systems, parallelism, which have diverse sorts of vulnerabilities. The fundamental security issue in a production application is that it has a Meg line of source code (Ouedraogo et al., 2015). Many developers in many languages compose the software and a considerably numerous of the programming languages have vulnerabilities. Application issues can contain the following aspects:-

- User front end
- User back end
- Platform
- Framework

- License
- Service Availability
- Parallel application

Trust and Conviction

The assessment of trust is affected by multi-aspects such as stockpiling equipment, virtualization, algorithm, and cloud stakeholders Chen and Zhao (2012). Trust and conviction can contain the following aspects:-

- Human factor
- Forensic
- Reputation
- Governance
- Trusted third party
- Less of consumer trust

Client Management Issue

This section covers the customers' expertise, its validation framework, personal awareness, and identity, their administration level administration, contractual worker foundation (Attas and Batrafi, 2011). Client management issue can contain the following aspects:-

- Client experience
- Service level management
- Client authentication

- Client centric privacy

Operating System

The cloud computing system employs numerous virtual machines, disparate servers in an internal mesh; different sort of operating systems cooperating together imparted numerous security challenges. Operating system can containthe following aspects:-

- Desktop OS
- Server OS
- Network OS
- Smartphone OS

Clustering Computing

Cluster computing uses numerous PCs, virtual machine, servers and they set to be freed or firmly associated that cooperate that they can see as a solitary framework is called computer cluster. The cloud computing uses the clustering to run the parallel handling application in undertakings (Kim et al., 2013). But these imparted numerous difficulties while expanding the nodes per bunch for the framework overseer. Clustering computing can containthe following aspects:-

- Physical cluster
- Multi-cluster
- Virtual cluster
- Data-intensive applications

Cloud Data Storage

Data stockpiling is additionally a standout amongst the most vital components of cloud computing. As the developing of numerous online application and web gadgets, the capacity of information and its security over the disseminated computing is a huge issue. Many reasons behind challenges to the data stockpiling such as stockroom location, unreliable data, untrustworthy data, availability, anonymity, cryptography, data loss, data leakage, maintenance, sterilization, support, and area insurance of metadata (Hussein et al., 2016). Cloud data storage can contain the following aspects:-

- Data warehouse
- Anonymity
- Availability
- Cryptography
- Data loss and leakage
- Malware and worm
- Integrity and confidentiality issues
- Inference

Table 3 Illustrates most security requirement and threats in cloud system (Mushtaq et al, 2017).

Cloud Level	**Physical Level**	**Virtual Level**	**Application Level**
Cloud Services	Physical datacenter	IaaS, PaaS	SaaS

Users	Owner owns the cloud infrastructure that applies to the organization or customer	Developers deploy software on the infrastructure of the cloud that applies to the organization or customer	End user subscribes the services provides by cloud provider that applies to the organization or customer
Security Requirements	• Protection of network resources • Network protection • Legal use of cloud infrastructure • Security and reliability of hardware	• Virtual cloud Protection • Cloud control management security • Access control • Communication and application security • Security of data (transit/ rest/ remanence)	• Software security • Protection of data from exposure • Privacy in multi-tenant environment • Service availability • Communication protection • Access control
Security Threats	• Misuse of cloud infrastructure • Hardware modification or interruption or stealing	• Network exposure • Session hijacking • Software interruption or	• Privacy breach • Network exposure • Interception • Analysis of traffic flow

	• Network attacks • DDOS • Natural disasters • Connection flooding	modification • Connection flooding • Programming flaws • Impersonation • DDOS • Traffic flow analysis	• Data interruption • Session hijacking • Data modification at transit or rest • Impersonation

Disadvantages of Cloud Storage

Accessibility: Without an internet connection, the customer cannot get access to his data.

Data Security: There are concerns about the safety and privacy of important data stored remotely. The possibility of private data commingling with other organizations makes some businesses uneasy.

Bandwidth: Several cloud storage services have a specific bandwidth allowance.

Dependency

One prime fault of cloud computing is client's reliance on the supplier, who store their information in third-part (TechinMind, 2012).

Migration Issue

Relocation issue is additionally a major worry about cloud computing. Might the client need to change to some other Provider then it is difficult to exchange gigantic information starting with one supplier then the next.Migration will take more bandwidth and the time, and some cloud suppliers, such as Amazon will oblige clients to pay exchange charges (Chen & Zhao, 2012).

Conclusion

Cloud computing provides a large of services and advantages to clients. Although benefits are offered by the cloud, and still not free of challenges and disadvantages. One of the most insomnia for both customers and providers is security issues. We highlighted some of the reasons beyond the weakness in the cloud environment, a security requirement, security threats, and challenges, either in cloud architecture or customers less conscious about these risks, which make it susceptible to such digital attacks. Also, we highlighted the disadvantages of cloud storage, cloud-computing services, cloud computing types, and cloud-computing basic components.

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Unit Roots and Cointegration Test Between Real Non-Oil GDP Growth and Government Expenditure in The Libya from (1962-2006).

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Abstract:

The aim of the paper was to test the long-run equilibrium relationship between government expenditure and non-oil real gross domestic product to test the validity of Wagner's Law, using annual time series data taken from Libya covering the period 1962-2006. The theory of Cointegration analysis is discussed in details by Engle & Granger (1987). The Cointegration test is applied to determine the existence relationship between government expenditure and non-oil GDP growth using time series data from Libya. the test results show that the existence of a long run relationship in the results to confirms the strong positive impact of government expenditure on economic growth during the period of investigation.

Keywords: government expenditure, non-oil GDP, Cointegration, stationarity, Libya,

Introduction

The relationship between government expenditure (TGX) and gross domestic product (GDP) has been subject to research both in the public finance literature and in the literature dealing with macroeconomic modelling. The public growth has been subject for researchers to find out what causes or has effects on it.

Adolph Wagner (1883) formulated his famous law of increasing state activity for developing countries by linking the growth of government activity to economic development. Although there has been some disagreement among scholars regarding the correct interpretation of the hypothesis, Wagner's law has been generally interpreted as follows; as per capita income increases in industrializing nations, a rising share of an economy's resources will be devoted to public sector activities. Wagner's hypothesis, i.e., the proposal that there exists a long-run propensity for the public sector to grow, has become a stylised fact in public sector economics (Brown and Jackson, 1990).

many studies have been examined in the empirical confirmation of Wagner's hypothesis since the early 1960s. As new data sets on the relevant variables have become available, and more advanced econometric techniques have been developed, further tests of the law have been carried out. The discussion about the correct interpretation and validity of Wagner's hypothesis continues today. Most empirical studies have been based on either time series analysis of a single country or cross-sectional analysis of different countries. The empirical results of Wagner's hypothesis are inconclusive. Many time series studies find support for the hypothesis.

The purpose of this paper is to use the techniques of cointegration analysis to examine the long-run relationship between two variables. (Engle and Granger (1987) pioneered cointegration tests by proposing a residual based two step procedure to identify long-run relationships among stationary variables under study. We extend our analysis in the context of Libya to see the relationship between government expenditure and non-oil GDP. It is hoped that our findings will cast some light on explaining the government expenditure and non-oil GDP growth experienced by Libya in the period 1962 to 2006.

THE EMPIRICAL MODEL

This study Mann (1980) is followed and five different versions of Wagner's

Law empirically investigated for Libya. they have provided a useful comparison of the different interpretations of Wagner's law. Based on earlier studies, they proceed to devise five different formulations of the law. We present these different formulations below. In what follows, TGX is total government expenditure, GDP is the gross domestic product, and TGXC is total government expenditure on consumption, GDP/POP is per capita income and POP is the population. The following six different versions of Wagner's law have been most commonly investigated.

$$TGX = f(GDP) \quad (1)$$

$$TGXC = f(GDP) \quad (2)$$

$$TGX = f(GDP/POP) \quad (3)$$

$$TGX/GDP = f(GDP/POP) \quad (4)$$

$$TGX/POP = f(GDP/POP) \quad (5)$$

$$TGX/GDP = f(GDP) \quad (6)$$

This paper we will be using these formulations of Wagner's hypothesis for estimating the relationship between the total real non-oil GDP growth and government expenditure in Libya. The above formulations can be expressed in log-regression forms as follows:

$$\ln TGX = \alpha_1 + \beta_1 \ln(nonoilGDP) + u \quad (7)$$

$$\ln TGXC = \alpha_2 + \beta_2 \ln(nonoilGDP) + u \quad (8)$$

$$\ln TGX = \alpha_3 + \beta_3 \ln(nonoilGDP/POP) + u \quad (9)$$

$$\ln(TGX/nonoilGDP) = \alpha_4 + \beta_4 \ln(nonoilGDP / POP) + u \quad (10)$$

$$\ln(TGX/POP) = \alpha_5 + \beta_5 \ln(nonoilGDP/POP) + u \quad (11)$$

$$\ln(TGX/nonoilGDP) = \alpha_6 + \beta_6 \ln(nonoilGDP) + u \quad (12)$$

The above equations, the estimated coefficients of the independent variable stand for the elasticity of demand for government expenditures with respect to non-oil GDP which will produce different values depending on the version used. To validate Wagner's hypothesis, the straight GDP elasticity requires to be >1 and the ratio GDP elasticity needs to be >0.

Most previous empirical tests of Wagner's law in a single country over a long period have used time series data and the ordinary least squares (OLS) regression technique to estimate the above elasticity. Most of these empirical studies have found support for the law.

The Methodology

Our methodology in this study employed: the unit root tests for stationarity, Cointegration test, we used annual data for Libya over the period 1962-2006, and investigate the evidence of Wagner's law over this period. (Nelson and Plosser,1982). Test Cointegration analysis which has emerged as a recent econometric development, is utilised to examine the long-run relationship equilibrium between integrated time series. Our cointegration analysis using the residual based Engle and Granger. (Brooks, 2008).

Stationarity and Cointegration Tests

The main focus of this paper is to provide the general framework for the analysis. Some description of the econometric technique is presented. Econometricians suggest that, "the first step in any empirical analysis should be examining each of the variables individually to check their unit roots and their order of integration," (Holden and Thompson 1992). In our paper, the nonstationary property of the time series data must be considered first.

We employ the most widely used methods to test the time series data in our study for unit roots, which are the Augmented Dickey Fuller (ADF) test (Dickey –Fuller 1981) and Phillips-Perron (PP) test (1988). Then, by employing the cointegration technique, we test for the existence of a long-run relationship (equilibrium) between the variables. In each sub-section the findings reported include the findings of the different tests for the relationship between the independent variables (non-oil GDP) and the dependent variables (TGX, TGXC, TGX/POP, TGX/non-oil GDP).

Testing for Stationarity

A time series is considered to be stationary if its mean and variance are independent of time. If the time series is nonstationary, i.e. having a mean and or variance changing over time, it is said to have a unit root. Therefore, the stationarity of a time series is examined by conducting the unit root test. A nonstationary time series can be converted into a stationary time series by differencing. If a time series becomes stationary after differencing once, then the time series is said to be integrated of order one and denoted by I(1). Similarly, if a time series has to be differenced d times to make it stationary, then it is called integrated of order d and written as I (d). This paper uses the Augmented Dickey Fuller (ADF) statistic test (Dickey and Fuller, 1981).

Unit Root Tests

A useful preliminary step to performing any regression analysis is to uncover the properties and characteristics of the actual data involved. Such an analysis of the individual time series variables is important because the properties of the individual series have to be taken into account in modelling the data generating process of a system of potentially related variables (Lutkepohl and Kratzig 2004). Since all variables under investigation are time series variables, we need first to test the properties of the series. In fact, testing for the properties is important because (1) some time series techniques, cointegration analysis, for example, require that the time series involved be integrated of order greater than zero; (2) a nonstationary regress or invalidates many standard empirical results. For example, (Granger and Newbold (1974) found that the F-statistic calculated from a regression involving nonstationary time series does not follow the standard distribution.

Testing for unit roots in time series data has received considerable attention in recent econometric literature. Since there exists the problem of spurious regression involving the levels of the variables, we need to examine whether each series is stationary or whether the series has a stochastic trend. If a series contains a unit root, the time series data is not stationary and it will behave as a stochastic rather than a deterministic process.

Augmented Dickey-Fuller Test

Several methods of testing for unit roots have been proposed. The Augmented Dickey-Fuller (ADF) test has been most commonly used. In our examination here we will be adopting the Augmented Dickey-Fuller (ADF) testing method, Dickey and Fuller (1981).

In the ADF test, the null hypothesis is that the variable under investigation has a unit root, against the alternative that it does not. The substantially negative values of the reported test statistic lead to rejection of the null hypothesis (Dickey et, al., 1991). Tables 1 and 2 report the results of the Augmented Dickey-Fuller (ADF) unit root tests. In the case of the levels of the six variables, the t-values on the level obtained from ADF tests are clearly less negative than the critical values and therefore the null hypothesis of a unit root cannot be rejected for each variable used in all of the six versions of Wagner's law.

Also, Tables 1 and 2 shows the same test applied to the first differences to see whether we can achieve stationarity of the series by transforming the series. For the variables (total non-oil GDP), the results show that the calculated t-values are greater than the critical t-values at the 5% level of significance. This implies that the null hypothesis that the series have unit roots in their first differences are rejected which means that the variables are stationary in their first differences.

Table 1 Augmented Dickey-Fuller Unit Root Tests for Level and First Differences (non-oil GDP)

Variables	Level	First Difference	Lag Lengths	Order of Integration
	trend	No trend		
ln (nonoil GDP)	-2.258	-3.359*	3	I(1)
ln (nonoil GDP/POP)	-2.325	-3.555*	3	I(1)
Ln TGX	-2.164	-4.158*	0	I(1)
Ln TGX	-1.909	-3.160*	1	I(1)
Ln TGX/POP	-2.157	-4.215*	0	I(1)
Ln TGX/nonoil GDP	-1.676	-4.102*	1	I(1)

All regression estimations and test results are obtained by using Eviews 4 econometric software.

* Significant at 5% level.

Critical value in level at 5% is -2.933

Phillips-Perron Test

Another test we can use for unit root tests is the Phillips-Perron (PP) test which is a more comprehensive test for a unit root. Although it is similar to ADF tests, it incorporates an automatic correction to the Dickey-Fuller procedure to allow for auto correlated residuals (Brooks, 2002). The Phillips-Perron test is carried out using the t-statistic following the same procedure as the Augmented Dickey-Fuller approach. The major criticisms of the ADF and PP tests are that their estimation power is low if the process is stationary but with a root close to the nonstationary boundary. They have the tendency to over-reject the null hypothesis of nonstationarity when it is in fact true, and under-reject the null when it is false, (Brooks,2002), and (Harris,1995).

Table 2 present the results for the testing of stationarity for the real total non-oil real GDP. The results show that the null hypothesis of nonstationarity cannot be rejected when variables are in levels. However, after taking first differences, all variables become stationary.

Table 2 Phillips-Perron Test for Level and First Differences (non-oil GDP)

Variables	Level	First Difference	Lag Lengths	Order of Integration
	trend	No trend		
ln (nonoil GDP)	-1.920	-4.929*	2	I(1)
ln (nonoil GDP/POP)	-2.006	-5.094*	2	I(1)
ln TGX	-1.848	-4.191*	2	I(1)
ln TGXC	-1.560	-5.817*	2	I(1)
ln TGX/POP	-1.856	-4.254*	2	I(1)
ln TGX/nonoil GDP	-1.816	-6.732*	2	I(1)

* Significant at 1% level.

Critical value in level at 1% is -3.593

In addition, the results in Table 2 show that the null hypothesis of nonstationarity cannot be rejected when variables are in levels. However, after taking first differences, all variables become stationary. Therefore, we can conclude that all the variables are first difference stationary, that is, each series is characterised as integrated of order one I (1).

Table 3 Comparison of ADF and PP tests for total non-oil GDP

Variables	ADF test		Phillips-Perron Test (PP)	
	Level	First Difference	Level	First Difference
ln(nonoil GDP)	-2.258	-3.359**	-1.920	-4.929*
ln(non-oil GDP/POP)	-2.325	-3.555**	-2.006	-5.094*
ln TGX	-2.164	-4.158**	-1.848	-4.191*
ln TGXC	-1.909	-3.160**	-1.560	-5.817*
ln TGX/POP	-2.157	-4.215**	-1.856	-4.254*
ln TGX/nonoil GDP	-1.676	-4.102**	-1.816	-6.732*

*, ** significant at 1% and 5% level at respectively.

Critical value in level at 5% is -2.933 and -3.593 at 1%

Therefore, we can conclude that since differencing once produces stationarity, all the six series (non-oil GDP) used in the analysis are integrated of order one I(1). Once the order of integration has been established, then we can test whether there is a long-run relationship between all of the variables. Now, this being the case, we can proceed to perform a cointegration test as the next step in our empirical investigation.

Testing for Cointegration

Having established the number of unit roots in the variable, we proceed to test for cointegration. A cointegration test can be applied to determine the existence of a long-run relationship between the variables when the variables are integrated at the same level of integration. The concept of cointegration was first introduced into econometrics by (Granger (1981) and further developed by Engle and Granger (1987). The Engle and Granger two-step procedures involve firstly running the following cointegration regression:

$$Y_t = \alpha + \beta X_t + \varepsilon_t \quad (13)$$

If the residuals (ε_t) from the regression are I(0), then X_t and Y_t are said to be cointegrated. Clearly, the series need to be integrated of the same order for cointegration to be possible. To establish the stationarity of the residuals we can re- write equation (13) as follows:

$$TGX_t = \alpha + \beta GDP_t + \varepsilon_t \quad (14)$$

The long-run relationship of two variables is examined using the two-step test for cointegration proposed in (Engle and Granger (1987). Equation (14) can be written in log-linear from for the six versions with non-oil GDP of Wagner' law as follows:

$$\ln TGX = \alpha_1 + \beta_1 \ln(nonilGDP) + \varepsilon_1 \quad (15)$$

$$\ln TGXC = \alpha_2 + \beta_2 \ln(nonoilGDP) + \varepsilon_2 \quad (16)$$

$$\ln TGX = \alpha_3 + \beta_3 \ln(nonoilGDP/POP) + \varepsilon_3 \quad (17)$$

$$\ln(TGX/nonoilGDP) = \alpha_4 + \beta_4 \ln(nonoilGDP / POP) + \varepsilon_4 \quad (18)$$

$$\ln(TGX/POP) = \alpha_5 + \beta_5 \ln(nonoilGDP/POP) + \varepsilon_5 \quad (19)$$

$$\ln(TGX/nonoilGDP) = \alpha_6 + \beta_6 \ln(nonoilGDP) + \varepsilon_6 \quad (20)$$

These equations can be estimated through cointegration regressions to examine the long-run relationship between government expenditure and noon oil gross domestic product, and then testing whether the residual (ε_t) is I(0) or not.

The basic idea of cointegration is that if two or more series move together over time, combinations of these economic variables tend to converge in the long-run. If two or more I (1) variables tend to converge, or at least do not drift apart in the long-run, we can regard these variables as defining a long-run equilibrium relationship. Thus the concept of cointegration provides a theoretical foundation for dynamic modelling, and it also gives information about the long-run properties of data.

There are several tests of the cointegrating regression. Mainly, these are: DW which is the cointegration regression Durbin-Watson statistic derived from (Sargan and Bhargava (1983), the Dickey-Fuller (DF) test, and the Augmented Dickey-Fuller (ADF) test. All these tests are used by Engle and Granger (1987) and Hall (1986). However, they suggest that in most applications the ADF test for unit roots in the residuals is best. Hence, it was decided to use the Engle and Granger residual based approach.

We found that each of the variables used in all six versions of Wagner's law are I (1) in the real non-oil GDP variables. Since all series are integrated of the same order, the series can be tested for the existence of a long-run relationship between them, i.e. cointegration. The procedure used to establish the existence of a cointegrating relationship is as follows: First, the hypothesised long-run relationship is estimated by OLS. This is called the cointegrating regression. Second, we can obtain the residuals ε_t . To test stationarity for the residuals the study applies the ADF and PP tests. In other words, the null hypothesis of the cointegration test is that the residuals formed by the cointegrating regressions are not stationary.

Cointegration Tests with Non-Oil Real GDP

Since the variables are I (1), the cointegration technique is applied to different measures of government expenditure and real non-oil gross domestic product (GDP). The residuals from different regressions are then tested for stationarity using the ADF test and Phillips-Perron test (PP). If the residuals are I (0), then a long-run relationship holds between the government expenditure variable and non-oil GDP. Table 4 summarises the outcomes of the cointegration test with respect to real non- oil GDP for Libya.

Table 4 Cointegration Regressions with Total Real non-oil GDP (the residual – based ADF test)

	Cointegrating Regression	β	Residuals coefficient and unit root test	R^2
1	$\ln TGX = f(\ln(nonoilGDP))$	1.24 (28.93)	−0.180 (−1.67***)	0.95
2	$\ln TGXC = f(\ln(nonoilGDP))$	1.29 (27.19)	−0.11 (−1.329)	0.94
3	$\ln TGX = f(\ln(nonoilGDP/POP))$	1.92 (20.46)	−0.06 (−0.628)	0.90
4	$\ln(TGX/nonoilGDP) = f(\ln(nonoilGDP/POP))$	0.40 (6.11)	−0.19 (−1.61***)	0.47
5	$\ln(TGX/POP) = f(\ln(nonoilGDP/POP))$	1.40 (21.23)	−0.192 (−1.61***)	0.91
6	$\ln(TGX/nonoilGDP) = f(\ln(nonoilGDP))$	0.25 (5.73)	−0.180 (−1.66***)	0.43

*** indicate significance at 10% level.

Critical values in level at 1%, 5% and 10% are −2.618, −1.948, and −1.619 respectively.

Table 4 shows the Engle-Granger residuals based on the ADF cointegration test. We conclude that we must reject the null hypothesis of no cointegration in four out of six versions of Wagner's law: Peacock-Wiseman version (1), Musgrave version (4), Gupta-Michas version (5) and

Mann version (6), because the ADF statistic values are more negative than the critical values at 10% levels. Cointegrated relationships were found for the versions of Wagner's law with respect to real non-oil GDP. In this case, an even stronger result indicates that the real total government expenditure and real non-oil gross domestic product are subject to an equilibrium relationship in the long-run.

Another method which can be used to check the cointegration between the variables and the residuals is the (PP) test. The test results can be seen in Table 5 below.

Table (5) Cointegration Regressions with Total Real non-oil GDP (the residual – based PP test)

	Cointegrating Regression	β	Residuals coefficient and unit root test	R^2
1	$\ln TGX = f(\ln(nonoilGDP))$	1.24 (28.93)	−0.19 (−1.99**)	0.95
2	$\ln TGXC = f(\ln(nonoilGDP))$	1.29 (27.19)	−0.12 (−1.61 ***)	0.94
3	$\ln TGX = f(\ln(nonoil\ GDP/POP))$	1.92 (20.46)	−0.02 (−0.62)	0.90
4	$\ln(TGX / nonoilGDP) = f(\ln(nonoilGDP / POP))$	0.40 (6.11)	−0.21 (−2.04**)	0.47
5	$\ln(TGX / POP) = f(\ln(nonoILGDP/POP))$	1.40 (21.23)	−0.216 (−2.04**)	0.91
6	$\ln(TGX / nonoilGDP) = f(\ln(nonoilGDP))$	0.24 (5.73)	−0.19 (−1.995**)	0.43

** and*** indicate significance at 5% and 10% levels respectively.

Critical values in level at 1%, 5% and 10% are −2.616, −1.948, and −1.619 respectively.

The Engle and Granger (1987) residual based (PP) cointegration test results reject the null hypothesis with five versions of Wagner's law at the 5% and 10% level, and they are: Peacock-Wiseman version (1), Pryor version (2), Musgrave version (4), Gupta-Michas version (5) and Mann version (6). Because the PP critical value is more negative than the critical values at the 5% and 10% levels, the results show that there is a long-run relationship between government expenditure and non-oil GDP in these versions.

These results show that the real income elasticities range from 0.25 to 1.92 for real non-oil GDP in the ADF test and 0.24 to 1.85 with the PP test. Most of the elasticity coefficients in the above versions are greater than unity. These results imply that most versions support Wagner's law for Libya during the study period.

In general, the analysis of the results of the Engle-Granger test for cointegration is as follows. These results are mixed and sometimes inconsistent. As stated by (Obben (1998) and Cheong (2003), where there is inconsistency between the ADF results and the PP result, the number of cointegrating relationships ranges from three. Wagner's law is cointegrated tests, but version 3 is non cointegrated. β is sometimes less than unity in the PP tests.

Although some of our findings fail to reject the null hypothesis of no long-run relationship between the variables, we have to treat these results with caution. We need to consider the weaknesses and limitations of cointegration analysis. The findings of non-cointegration do not exclude the possibility of cointegration in some higher order system that includes more variables.

Summary

The aim of the paper was to test the long-run equilibrium relationship between measures of real government expenditure and non-oil real gross domestic product to test the validity of Wagner's Law, using annual time series data taken from Libya covering the period 1962-2006.

Although empirical studies have used a diversity of models to examine the relationship between government expenditure and economic growth, for our paper we have used six different formulations of the Law for real total real total non-oil GDP. The empirical analysis commenced with the examination of the time series properties of the variables. This procedure involved testing for stationarity and cointegration analysis.

Wagner's Law has found much support from many previous time series studies. However, these studies have suffered from frequent methodological problems in their time series analysis. Since they did not test the stationarity of the variables, the empirical results might lead to the problem of spurious regression. To overcome the problems of previous studies, I attempted to test the stationarity of the time series data on real government expenditure and real gross domestic product using Libyan data for the period from 1962-2006.

In specific terms, we tested for the existence of unit roots using the ADF and PP tests for all the variables. The unit root test results showed that all

the variables were nonstationary in levels, but stationary in first differences. This means they are integrated of order one I (1).

Since the variables are integrated of I(1), the cointegration test was applied, in order to investigate the long-run relationship on all versions of the regression models (non-oil GDP) based on the two step Engle-Granger method. Based on the results of the cointegration tests the null hypothesis of no cointegration test was rejected for many of the versions of Wagner's law with total total non-oil GDP.

In other words, there is some support for the existence of a long-run equilibrium relationship between government expenditure and GDP for the Libyan case.

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Self-Compacting Concrete

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Abstract:

The technology of durable concrete structures has been developed with the beginning of obtaining self-compacting concrete SCC in the eighteens.

Components and lest methods to ensure that the resulting concrete meets the conditions of self-compacting concrete explained in this research. All this was mentioned in this research. The objectives of study is to clear how to produce and tested SCC, the use of this kind of concrete allowed engineers to implement large projects in less time due to the use of self-compacting concrete.

Keywords:

SCC; Durable concrete; self-compactability; Stability; Superplastizer; Mix-design.

1-1 Introduction:

Self-compacting concrete is known to have the ability to flow under the influence of its own weight only so that it fills all aspects of the stress even in the presence of heavy reinforcement and without the need to use vibrators while maintaining the homogeneity of its components.

Stability and high-fluidity is one of the important properties that must be available in concrete, and this is what led the researchers to delve into self-compacting concrete.

The great development in the plasticizer industry helped to obtain this concrete.

In 1986 at the University of Tokyo, the first concrete production was made (The necessity of this type of concrete was proposed by Okamura in 1986), then they used it in many applications and facilities (Okamura and Ouchi, 2003).

1-2 Components ofSelf-Compacting Concrete

Self-compacting concrete is produced from the same materials that are used in conventional concrete in addition to the use of high plasticizers and powders,Table.1 shows the mixing ratios of self-compacting concrete compared to conventional mixes. This concrete is prepared with low water content by means of additives with High-range water reducers to reduce the mixing water to obtain a high cohesion viscosity, which prevents segregation of large aggregate from mortar when concrete flows through obstacles, the total content of powder materials less than 150 mikron No1.0 sieve is also increased by about (520-560) kg/m^3until there is a balance between deformability and stability(ACI 2014 and ECP 2017).

Table:1 Comparison of mixing proportions of Conventional and self-compacting concrete

Comparison	Cement	Water	Air	Fines	Fine Aggregate	Coarse Aggregate
Regular Mix	10%	18%	2%		25%	45%
Self-Compacting Concrete	10%	18%	2%	8%	26%	36%

1-2-1 Cement

Ordinary Portland cement is used that conforms to the specifications according to the ACI code, which mean that it must meet the technical requirements contained in this code or any another international code.

1-2-2 Aggregate

The aggregate content is smaller than conventional concrete that requires vibrating compaction.

In self-compacting concrete the larger nominal size of coarse aggregate should be not more than 20 mm and smaller, while small aggregate particles with a size of less than 0,125 mm are considered within the powder content, granules of natural aggregates must be solid and without materials harmful to concrete or steel reinforcement, as well as must be free from impurities of organic materials that affect the doubt, hardening and resistance of concrete.

1-2-3 Mixing Water

Water is used in Self-compacting concrete and it is stipulated in the mixing water that the percentage of salts be according to the quantities allowed in the code, that is do not exceed a certain limit. It is given the same specifications of conventional concrete mixing water. The water used in curing shall not cause staining, blooming, sedimentation or any other unacceptable phenomena on the concrete surface.

The Self-compacting concrete mix is designed with a water content of (0.45 - 0.50) water/cement ratio, which usually acquires a strength in the range of 40 Mpa.

1-2-4 Additives

1-2-4-1 Chemical additives

Superplasticizers are added to obtain Self-compacting concrete with suitable workability, other types of additives are also used such as viscosity-improving additives, shrinkage reducers and set-retarding additives.

1-2-4-2 Mineral additives

These additives are represented in fly ash, silica fume and granulated blast-furnace slag (slag cement). It is purpose is to improve the operability, strength and durability of Self-compacting concrete. Coloring additives may be used when usingSelf-compacting concrete in finishing concrete surfaces, provided that they are suitable for this type of concrete.

1-2-5 Powders

Stone are finely ground so that their granule size is less than 0.125 mm, such as quartz powder, limestone, dolomite and granite. It is used to increase the content of fine materials in the mixture to achieve the required fluidity as well as reduce production costs.

1-2-6 Fibres

Addition of fibres to Self-compacting concrete should not affect mixing, transportation and handing. This done byconducting trial mixtures on site before producing SCC. There are several types of fibres, including steel fibres, which increase resistance of bending and durability, and polymeric fibres that reduce shrinkage and segregation.

1-3 Mix design

To produce Self-compacting concrete the mix design should be investigate all requirement of fresh and hard concrete, in addition to taking the main components of the mixture in terms of volume instead of weight as in traditional concrete as follows:

- The water powder ratio in volume is (0.8-1.10) by volume and usually the water content is less than 200 l/m^3.
- Powder content (400-600) kg/m^3.
- Cement content is more than 350 kg/m^3.
- Coarse aggregate content (30-35) % of concrete mix volume.
- Fine aggregate content (40-50) % from the weight of total aggregate.
- The superplasticizer dosage determined to ensure self-compactability later in test methods the method of making, pouring and curing Self-compacting concrete.

1-4 Self-Compacting Concrete Tests

The tests that are used to detect concrete in it is fresh state to ensure that it meets the requirements of self-compacting concrete are as follows:

1-4-1 Slump Flow Test:

A standard landing cone is placed on a metal plate of standard dimensions and then two circles are drawn on the plate, the smallest circle for given diameter and the largest for recording the time required for flow (Fig.1). The slump is filled with concrete and the surface is levelled and the concrete is not compacted. Then the slump is lifted vertically and the time required for the diameter of concrete on the metal plate to reach a certain diameter is recorded, when the concrete stops flowing, the final diameter is calculated by taking the average of two perpendicular diameter. If the result is within the permissible limits, it is acceptable. That is, the time of arrival of the concrete flow diameter in the landing slump must be proportional to the flow diameter according to the ACI code.

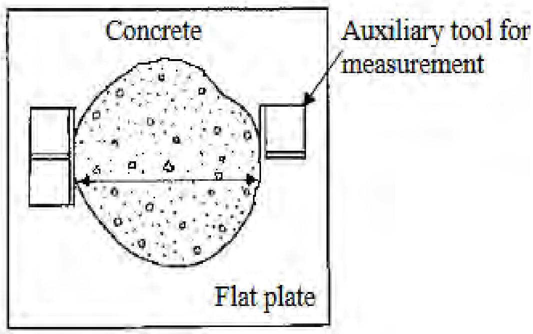



Fig.1The Slump Flow Test

1-2-4 V-Funnel Test:

Funnel test hase been proposed for testing the viscosity of SCC as follows.

1- Wash the funnel with water and clean the internal surface by cloth, the reception is placed as the closed repression portal (Fig.2).

2- Casting Scc in the funnel without compacting.

3- Open the portalthrough 10 sec after full funnel and then we have to recorded the time will be recorded by hour stopping.

4- Repeat the funnel with concrete directly, and left for 5 minutes and then opens the gate and measure time as above.

5- If to =(6-12) sec and (t_s –t_0)less than 3 sec, the concrete has sufficient self-compactability.

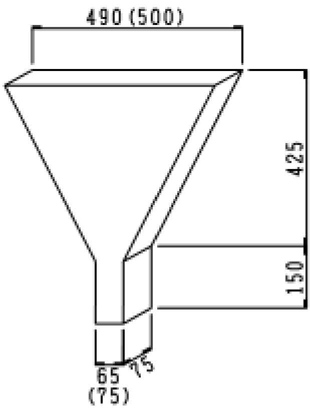


Fig.2 V-Funnel Test

1-4-3 U-Flow Test or Box Test:

The U-flow test was developed by the Taisei Group (Hayakawa, 1993). The test is recommended (Fig.3).

1- The test box makes it a solid material as shown. Put the device in vertical case with horizontal case for top edge and then make sure we can open the gate easily.

2- The internal surface of the device is moisturized with water, without leaving any amount of water.

3- The first room is filled with concrete without vibration or compression.

4- Clean the excess concrete then leaves for a minute.

5- Open the gate in quick movement then leave the concrete flow to the second room until the end of flow.

6- Measurement the average height of concrete (H_1 and H_2) from the bottom of room to the top surface, then calculate ΔH ($\Delta H = H2 - H_1$).

7- If ΔH less than or equal 30 mm the concrete has sufficient self-compactability.

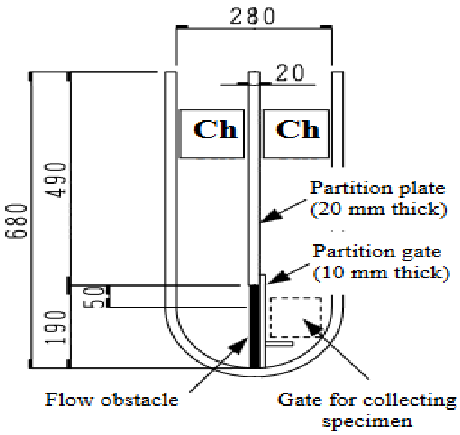


Fig.3U-Box Test.

1-4-4 Balance Test on 5 mm Sieve:

An accurate laboratory test to check resistance of segregation as follows.

1- The test sample is placed in a 10 liters container and left in it for 15 minutes, covering the container with it is lid to avoid evaporation.

2- A sieve with holes 5mm and a diameter of 350 mm is used, which is placed on top of a container whose weight has been determined when it is empty.

3- Pour 2 liters of concrete into a container and then determine the weight of the container when it is filled with concrete.

4- Concrete is poured over the sieve from a height of 500 mm.

5- Determines the weight of the container after it is completely emptied, and the weight of the concrete that has been poured (M_a).

6- Left the concrete dropped from opining sieve for two minutes.

7- Determine the actual weight of concrete which passed from sieve by the difference between full weight of container which found under sieve and weight it for empty, then we can calculate the percentage of sample weight which pass from sieve. Factor of segregation (SRI) as follows.

$SRI = (M_b/M_a) \times 100$

If the value of SRI ranged between (5-15)% the concrete will be SCC.

1-5 Applications of Self-compacting concrete

The first application of Self-compacting concrete was in a building in June 1990 (Skarendahl and Petersson, 1999), then used in the towers of a prestressed concrete. Cable-stayed bridge in (Fig.4) 1991 (Skarendahal and Petersson, 1999). The main purpose for using SCC is to:

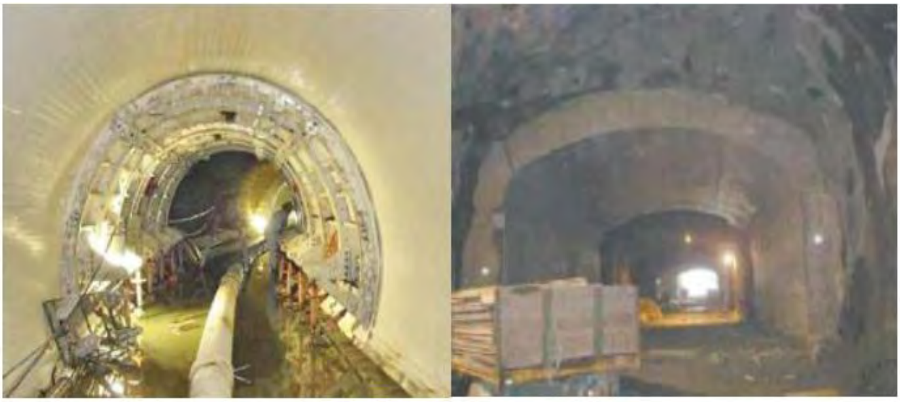
1-Shorten construction period (for large scale constructions).

2- Eliminate the noise of vibration.

3- Facilitate casting, especially in sectors crowded with reinforcement steel (Ouchi, Nakamura, Osterbergand Hallberg, 2003).

The following figures show some applications for the use of self-compacting concrete.

Fig.4Anchorage of Akashi-KaikyoBridg, Japan.



(a) (b)

Fig.5 a)Tunnel picture in Los Angeles, USA

b) View of the tunnel arch in SWEDEN

Fig.6Burj Dubai and Arlanda Airport Control Tower

Conclusions

Full use of self-compacting concrete introduced in so many structural which led to make the Self-compacting concrete become a standard concrete with special specifications, this led to it is becomes so widely used in high rise building and other structures. Both rational mix-design method and an appropriate acceptance testing method in many researches that are concerned with Self-compacting concrete and conducting the necessary tests on it to ensure that it matches the conditions of Self-compacting concrete have proven efficiency. V-funnel test and U-filling ability test have proven their efficiency in testing SCC in many previous studies. In addition, durable concrete structures are what we need to make safe and development life for us, and this available in self-compacting concrete as clear from previous studies.

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