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# Economics




Environmental Kuznets Curve (EKC)

Hybrid Classical-Quantum Computing

Highlights

Impact of the Bolsa Família Program

Revenue Generation Trend of Thiruvallur

**Discovering Thoughts, Inventing Future**

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# Hybrid Classical-Quantum Computing: Applications to Statistical Mechanics of Neocortical Interactions

By Lester Ingber

*Abstract-* Several commerical quantum computers are now available that offer Hybrid Classical-Quantum computing. Application is made to a classical-quantum model of human neocortex, Statistical Mechanics of Neocortical Interactions (SMNI), which has had its applications published in many papers since 1981. However, this project only uses Classical (super-) computers.

Since 2015, PATHINT, has been used as a numerical algorithm for folding path-integrals. Applications in several systems in several disciplines has generalized been from 1 dimension to N dimensions, and from classical to quantum systems, qPATHINT. Papers have applied qPATHINT to neocortical interactions and financial options.

The classical space described by SMNI applies nonlinear nonequilibrium multivariate statistical mechanics to synaptic neuronal interactions, while the quantum space described by qPATHINT applies synaptic contributions from Ca2+ waves generated by astrocytes at tripartite neuron-astrocyte-neuron sites.

*Keywords:* *path integral, quantum systems, neocortical interactions.*

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# Hybrid Classical-Quantum Computing: Applications to Statistical Mechanics of Neocortical Interactions

Lester Ingber

*Abstract-* Several commerical quantum computers are now available that offer Hybrid Classical-Quantum computing. Application is made to a classical-quantum model of human neocortex, Statistical Mechanics of Neocortical Interactions (SMNI), which has had its applications published in many papers since 1981. However, this project only uses Classical (super-)computers.

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The classical space described by SMNI applies nonlinear nonequilibrium multivariate statistical mechanics to synaptic neuronal interactions, while the quantum space described by qPATHINT applies synaptic contributions from Ca2+ waves generated by astrocytes at tripartite neuron-astrocyte-neuron sites.

Previous SMNI publications since 2013 have calculated the astrocyte Ca2+ wave synaptic interactions from a closed-form (analytic) expression derived by the author. However, more realistic random shocks to the Ca2+ waves from ions entering and leaving these wave packets should be included using qPATHINT between electroencephalographic (EEG) measurements which decohere the quantum wave packets.

This current project extends calculations to multiple scales of interaction between classical events and expectations over the Ca2+ quantum processes to include these random shocks to fit EEG data to the SMNI model, with previous analytic forms for the quantum processes replaced by qPATHINT. The classical-quantum system is fit using the author's Adaptive Simulated Annealing (ASA) importance-sampling optimization code. Gaussian Quadratures are used for numerical calculation of momenta expectations of the astrocyte processes that contribute to SMNI synaptic interactions.

This project demonstrates how some hybrid classical-quantum systems may be calculated using only classical (super-) computers.

Recent calculations also are reported using the closed-form expression, with and without shocks.

*Keywords: path integral, quantum systems, neocortical interactions.*

## I. Introduction

### a) Hybrid Computing

Several commercial Classical-Quantum computers now can be accessed via the Cloud, e.g., Rigetti, D-Wave, Microsoft, and IBM [Ingber(2021a)]; see

https://docs.ocean.dwavesys.com/projects/hybrid/en/latest/index.html
https://www.rigetti.com/what
https://azure.microsoft.com/en-us/solutions/hybrid-cloud-app/#overview
https://www.ibm.com/it-infrastructure/z/capabilities/hybrid-cloud

These Classical computers often run optimization program in systems that are described by quantum variables using these companies' Quantum computers [Benedetti ~al. (2019) Benedetti, Lloyd, Sack, Fiorentini], Several studies show Quantum computers still cannot deal with many systems even with classical optimizers [Chakrabarti ~al. (2020) Chakrabarti, Krishnakumar, Mazzola, Stamatopoulos, Woerner, Zeng]. Still, Software continues to be developed for quantum systems, e.g., Tensorflow for machine learning also offers Hybrid classical-quantum computing:

https://quantumzeitgeist.com/tensorflow-for-quantum-hits-first-birthday/
https://www.tensorflow.org/quantum

Two previous XSEDE project-codes are merged for this project, "Electroencephalographic field influence on calcium momentum waves" and "Quantum path-integral qPATHTREE and qPATHINT algorithms". These Classical codes on Classical computers define a Hybrid Classical-Quantum system.

Previous fits to electroencephalographic (EEG) data have been published using quantum wave-packets defining a specific class of (re-)generated Ca2+ ions at tripartite neuron-astrocyte-neuron sites, which influence synaptic interactions [Ingber(2018)]. Since 2011 [Ingber(2011), Ingber(2012a)], During tasks requiring short-term memory (STM), classical as well as quantum calculations are consistent with interactions between momenta p of these wave-packets with a magnetic vector potential A generated by highly synchronous firings of many thousands of neocortical neurons. An anayltic (closed-form) path-integral calculation of the quantum process, in terms of a wave-function with expectation value p interacting with A, defines quantum interactions coupled to a macroscopic system [Ingber (2017a)].

It is important to further address this system using these to enable realistic inclusion of shocks to the wave-packet. Due to the regenerative process of the

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wave-packet, e.g., due to collisions between Ca2+ ions in the wave-packet causing some ions to leave the wave-packet during its hundreds of msec lifetime, or as new ions enter from the astrocyte processes, the wave-function is repeatedly projected onto quantum sub-spaces. These may be considered as random processes [Ross (2012)]. PATHTREE/qPATHTREE and PATHINT/qPATHINT can include shocks in the evolution of a short-time probability distribution over thousands of foldings [Ingber(2016a), Ingber(2017a), Ingber (2017b)].

*b) SMNI*

Statistical Mechanics of Neocortical Interactions (SMNI) was developed in the late 1970's [Ingber(1981), Ingber(1982), Ingber(1983)] and enhanced since by fitting experimental data from short-term memory (STM) and electroencephalography (EEG), including papers on fits to attention data [Ingber(2018)] and affective data [Alakus ~al.(2020) Alakus, Gonen, Turkoglu, Ingber(2021b)].

*c) PATHINT*

The path-integral defines code that numerically propagates short-time conditional probability distributions [Ingber ~al.(1991)Ingber, Fujio, Wehner, Wehner Wolfer(1983a), Wehner Wolfer(1983b)]. This was generalized to PATHINT in N dimensions, and applied in several disciplines [Ingber(2000a), Ingber Nunez(1995), Ingber ~al.(1996) Ingber, Srinivasan, Nunez, Ingber Wilson(2000)], and to PATHTREE [Ingber ~al.(2001)Ingber, Chen, Mondescu, Muzzall, Renedo].

*d) qPATHINT*

PATHTREE and PATHINT were generalized to quantum systems, qPATHTREE and qPATHINT [Ingber(2016a), Ingber(2017b), Ingber(2017c)].

A companion paper treats "Hybrid classical-quantum computing: Applications to statistical mechanics of financial markets" [Ingber(2021c)].

*e) Organization of Paper*

Section 2 further describes SMNI in the context of this project.

Section 3 further describes Adaptive Simulated Annealing (ASA) in the context of this project.

Section 4 further describes qPATHINT in the context of this project.

Section 5 describes how the calculation proceeds between SMNI and qPATHINT.

Section 6 describes performance and scaling issues.

Section 7 gives motivation to this project. Calculations performed on the Ookami supercomputer at StonyBrook.edu test a closed-form derived solution with and without shocks. Shocks clearly lower cost functions.

Section 8 is the Conclusion.

*f) Caveat*

As stated previously in these projects [Ingber(2018)], "The theory and codes for ASA and [q]PATHINT have been well tested across many disciplines by multiple users. This particular project most certainly is speculative, but it is testable. As reported here, fitting such models to EEG tests some aspects of this project. This is a somewhat indirect path, but not novel to many physics paradigms that are tested by experiment or computation."

## II. SMNI

Statistical Mechanics of Neocortical Interactions (SMNI) has been developed since 1981, in over 30+ papers, scaling aggregate synaptic interactions describing neuronal firings, scaling minicolumnar-macrocolumnar columns of neurons to mesocolumnar dynamics, and scaling columns of neuronal firings to regional (sensory) macroscopic sites identified in EEG studies [Ingber(1981), Ingber(1982), Ingber(1983), Ingber(1984), Ingber(1985a), Ingber(1994)].

Success of SMNI has been to discover agreement/fits with experimental data from modeled aspects of neocortical interactions, e.g., properties of short-term memory (STM) [Ingber(2012a)], including its capacity (auditory 72 and visual 42), duration, stability, primacy versus recency rule [Ingber(1984), Ingber (1985a), Ingber(1994), Ingber(1995), Ingber(2000b), Ingber(2012a), Ingber Nunez(1995)], EEG dispersion relations [Ingber(1985b)], as well other phenomenon, e.g., Hick's law [Hick(1952), Ingber(1999), Jensen (1987)], nearest-neighbor minicolumnar interactions within macrocolumns calculating rotation of images, etc [Ingber(1982), Ingber(1983), Ingber(1984), Ingber (1985a), Ingber(1994)]. SMNI was also scaled to include mesocolumns across neocortical regions to fit EEG data [Ingber(1997), Ingber(2012a), Ingber(2012b), Ingber (2018), Ingber Nunez(2010)].

*a) XSEDE EEG Project*

The Extreme Science and Engineering Discovery Environment (XSEDE.org) project since February 2013, "Electroencephalographic field influence on calcium momentum waves," has fit SMNI to EEG data, developing ionic Ca2+ momentum-wave effects among neuron-astrocyte-neuron tripartite synapses modified parameterization of background SMNI parameters. Both classical and quantum physics support the development of the vector magnetic potential of EEG from highly synchronous firings, e.g., as measured during selective attention, as directly interacting with these momentum-waves, creating feedback between these ionic/quantum and macroscopic scales [Ingber(2012a), Ingber(2012b), Ingber(2015), Ingber(2016b), Ingber(2017b), Ingber(2017c), Ingber(2018), Ingber ~al.(2014)Ingber,



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Pappalepore, Stesiak, Nunez ~al.(2013)Nunez, Srinivasan, Ingber].

i. *qPATHINT for SMNI*

qPATHINT includes quantum regenerative process to Ca2+ wave-packets as reasonable shocks to the waves that typically do not damage its coherence properties. A proof of principal has been published [Ingber(2017b)].

*b) SMNI With A*

A model of minicolumns as wires supporting neuronal firings, largely from large neocortical excitatory pyramidal cells in layer V (of I-VI), gives rise to currents, in turn giving rise to electric potentials measured as scalp EEG [Ingber(2011), Ingber(2012a), Nunez ~al.(2013)Nunez, Srinivasan, Ingber]. This gives rise to a magnetic vector potential.

$$\mathbf{A} = \frac{\mu}{4\pi}\mathbf{I}\log\left(\frac{r}{r_0}\right) \tag{1}$$

Note the log-insensitive dependence on distance. In neocortex, $\mu \approx \mu_0$, where 0 is the magnetic permeability in vacuum $= 4\pi 10^{-7}$ H/m (Henry/meter), where Henry has units of kg-m-C $^{-2}$, the conversion factor from electrical to mechanical variables. For oscillatory waves, the magnetic field $\mathrm{B} = \nabla \times \mathrm{A}$ and the electric field $\mathrm{E} = (ic/\omega)\nabla \times \nabla \times \mathrm{A}$ do not have this log dependence on distance. Thus, A fields can contribute collectively over large regions of neocortex [Ingber(2012a), Ingber(2012b), Ingber(2015), Ingber(2016b), Ingber(2017b), Ingber(2017c), Ingber(2018), Ingber ~al.(2014)Ingber, Pappalepore, Stesiak, Nunez ~al.(2013)Nunez, Srinivasan, Ingber]. The magnitude current is deermined by experimental data on dipole moments $\mathrm{Q} = |\mathrm{I}|\hat{\mathrm{z}}$ where $\hat{\mathrm{z}}$ is the direction of the current $\mathrm{I}$ with the dipole spread over z. $\mathrm{Q}$ ranges from 1 pA-m $= 10^{-12}$ A-m for a pyramidal neuron [Murakami Okada(2006)], to $10^{-9}$ A-m for larger neocortical mass [Nunez Srinivasan(2006)]. Currents give rise to $q\mathrm{A} \approx 10^{-28}$ kg-m/s. The velocity of a $\mathrm{Ca}^{2+}$ wave can be ≈20-50 $\mu$m/s. In neocortex, a typical $\mathrm{Ca}^{2+}$ wave of 1000 ions, with total mass $m = 6.655 \times 10^{-23}$ kg times a speed of ≈20-50 $\mu$m/s, gives $\mathrm{p} \approx 10^{-27}$ kg-m/s. This yields $\mathrm{p}$ to be on the same order as $q\mathrm{A}$.

i. *Results Including Quantum Scales*

The wave-function $\psi_{\mathrm{e}}$ of the interaction of $\mathrm{A}$ with $\mathrm{p}$ of $\mathrm{Ca}^{2+}$ wave-packets was derived in closed form from the Feynman representation of the path integral using path-integral techniques, not including shocks [Schulten(1999)], modified here to include $\mathrm{A}$.

$$\psi_{\mathrm{e}}(t) = \int \dagger d\mathbf{r}_0\psi_0\psi_F = \left[\frac{1 - i\hbar t/(m\Delta\mathbf{r}^2)}{1 + i\hbar t/(m\Delta\mathbf{r}^2)}\right]^{1/4} [\pi\Delta\mathbf{r}^2\{1 + [\hbar t/(m\Delta\mathbf{r}^2)]^2\}]^{-1/4}$$

$$\times \exp\left[-\frac{[\mathbf{r}-(\mathbf{p}_0+q\mathbf{A})t/m]^2}{2\Delta\mathbf{r}^2}\frac{1-i\hbar t/(m\Delta\mathbf{r}^2)}{1+[\hbar t/(m\Delta\mathbf{r}^2)]^2} + i\frac{\mathbf{p}_0\cdot\mathbf{r}}{\hbar} - i\frac{(\mathbf{p}_0+q\mathbf{A})^2 t}{2\hbar m}\right] \tag{2}$$

PATHINT also has been used with the SMNI Lagrangian $L$ for STM for both auditory and visual memory [Ericsson Chase(1982), Zhang Simon(1985)], calculating the stability and duration of STM, the observed $7 \pm 2$ capacity rule of auditory memory, and the observed $4 \pm 2$ capacity rule of visual memory [Ingber(2000a), Ingber Nunez(1995)].

ii. *Results using* $< p >_{\psi * \psi}$

The author previously used his derived analytic expression for $< p >_{\psi * \psi}$ in classical-physics SMNI fits to EEG data using ASA [Ingber(2016b), Ingber ~al.(2014)Ingber, Pappalepore, Stesiak]. Runs using 1M or 100K generated states gave not much different results. ASA Training with 100K generated states over 12 subjects with and without $\mathrm{A}$, was followed by 1000 generated states with the simplex local code contained with ASA to check precision. XSEDE.org resources took an equivalent of several months of CPU on the XSEDE.org UCSD San Diego Supercomputer (SDSC) platform Comet for Training and Testing runs. Calculations used one additional parameter across all EEG regions to weight the contribution to synaptic background $B_G^G$. $\mathrm{A}$ was proportional to the currents measured by EEG, i.e., firings $M^G$. The "zero-fit-parameter" SMNI philosophy was enforced, wherein parameters are selected and enforced between experimentally determined ranges [Ingber(1984)].

Sopmetimes Testing cost functions were less than their Training cost functions, a result sometimes found in previous studies using this data. This likely is due to great differences in data, likely from great differences in subjects' contexts, e.g., possibly due to subjects' STM strategies including effects calculated here. ASA optimizations in this project always included "finishing" ASA importance-sampling with the modified Nelder-Mead simplex code included in the ASA code to ensure best precision.

iii. *Assumptions for quantum SMNI*

Some assumptions made for this quantum enhancement of SMNI can be determined by future experiments.

The quantum wave-function of the $\mathrm{Ca}^{2+}$ wave-packet was calculated, adding multiple collisions due to their regenerative processes, and it was demonstrated that overlaps with just-previous wave-functions during the observed long durations of hundreds of ms typical of $\mathrm{Ca}^{2+}$ waves [Ingber(2015), Ingber(2016b), Ingber(2017b), Ingber(2017c), Ingber(2018), Ingber



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~al.(2014)Ingber, Pappalepore, Stesiak] support a Zeno or "bang-bang" effect [Burgarth ~al.(2018) Burgarth, Facchi, Nakazato, Pascazio, Yuasa, Facchi ~al.(2004)Facchi, Lidar, Pascazio, Facchi Pascazio (2008), Giacosa Pagliara(2014), Kozlowski ~al.(2015) Kozlowski, Caballero-Benitez, Mekhov, Muller ~al. (2016) Muller, Gherardini, Caruso, Patil ~al.(2015)Patil, Chakram, Vengalattore, Wu ~al.(2012) Wu, Wang, Yi] which may promote long coherence times.

Inclusion of repeated random shocks to the above wave-function $\psi_F(t)$ demonstrated only small effects on the projections of the wave-packet after these shocks, i.e., the survival time was calculated [Facchi Pascazio(2008), Ingber(2018)].

Of course, the Zeno/"bang-bang" effect may exist only in special contexts, given that decoherence among particles is known to be very fast [Preskill(2015)]. Therefore, the constant collisions of $Ca^{2+}$ ions as they enter and leave the $Ca^{2+}$ wave-packet due to the regenerative process that maintains the wave may perpetuate at least part of the wave, permitting the Zeno/"bang-bang" effect. qPATHINT as used here provides an opportunity to explore the coherence stability of the wave due to serial shocks of this process.

iv. *Nano-Robotic Applications*

It is possible that the above considerations could lead to pharmaceutical products contained in nanosystems that could affect unbuffered $Ca^{2+}$ waves in neocortex [Ingber(2015)]. A $Ca^{2+}$-wave momentum-sensor could act like a piezoelectric device [Ingber (2018)].

The nano-robot would be sensitive to local electric/magnetic fields. Highly synchronous firings during STM processes could be directed by piezoelectric nanosystems to affect background/noise efficacies via control of $Ca^{2+}$ waves. This could affect the influence of $Ca^{2+}$ waves via the vector potential A, etc.

v. *Free will*

Further qPATHINT calculations could give additional support to researching possible quantum influences on highly synchronous neuronal firings relevant to STM, yielding connections to consciousness and "Free Will" (FW).

As described previously [Ingber(2016a), Ingber(2016b)], experimental feedback from quantum-level processes of tripartite synaptic interactions with large-scale synchronous neuronal firings, recognized as being highly correlated with STM and states of attention, may be established using the quantum no-clone "Free Will Theorem" (FWT) [Conway Kochen(2006), Conway Kochen(2009)].

$Ca^{2+}$ quantum wave-packets may generate states proven to have not previously existed, since quantum states cannot be cloned. In this context, these quantum states may be influential in large-scale patterns of synchronous neuronal firings, rendering these patterns as truly new. The FWT may consider these patterns as new decisions not solely based on previous decisions. These considerations are quite different and independent of other philosophical considerations, e.g., as in https://plato.stanford.edu/entries/qt-consciousness/.

Note that only recently has the core SMNI hypothesis since circa 1980 [Ingber(1981), Ingber(1982), Ingber(1983)], that highly synchronous patterns of neuronal firings process high-level information, been verified experimentally [Asher(2012), Salazar ~al.(2012)Salazar, Dotson, Bressler, Gray].

*c) qPATHINT for SMNI*

A previous project tested applications of qPATHTREE and qPATHINT. The wave-function $\psi$ is numerically propagated from its initial state, growing into a tree of wave-function nodes. At each node, interaction of the of $Ca^{2+}$ wave-packet, via its momentum p, with highly synchronous EEG, via its collective magnetic vector potential A, determines changes of time-dependent phenomena. Changes occur at microscopic scales, e.g., due to modifications of the regenerative wave-packet as ions leave and contribute to the wave-packet, determining the effect on tripartite contributions to neuron-astrocyte-neuron synaptic activity, affecting both p and A. Such changes also influence macroscopic scales, e.g., changes due to external and internal stimuli affecting synchronous firings, and thereby A. At every time slice, quantum effects on synaptic interactions are determined by expected values of the interactions over probabilities $(\psi^*\psi)$ determined by the wave-functions at their nodes.

Due to the form of the quantum Lagrangian/Hamiltonian, a multiplicative Gaussian form (with nonlinear drifts and diffusions) is propagated. This permits a straight-forward use of Gaussian quadratures for numerical integration of the expectation of the momenta of the wave-packet, i.e., of $< p(t) >_{\psi^*\psi}$. E.g., see https://en.wikipedia.org/wiki/Gaussian_quadrature

*d) Comparing EEG Testing Data with Training Data*

Using EEG data from [Citi ~al. (2010)Citi, Poli, Cinel, Goldberger ~al. (2000)Goldberger, Amaral, Glass, Hausdorff, Ivanov, Mark, Mietus, Moody, Peng, Stanley] http://physionet.nlm.nih.gov/pn4/erpbci

As was done previously, fitting SMNI to highly synchronous waves (P300) during attention tasks, for each of 12 subjects, it is possible to find 10 Training runs and 10 Testing runs [Ingber(2016b)]. A region of continuous high amplitude of 2561 lines represents times from 17 to 22 secs after the tasks began.

Spline-Laplacian transformations on the EEG potential $\Phi$ are proportional to the SMNI $M^G$ firing variables at each electrode site. The electric potential $\Phi$ is experimentally measured by EEG, not A, but both are

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due to the same currents I. Therefore, A is linearly proportional to Φ with a simple scaling factor as a parameter in fits. Additional parameterization of background synaptic parameters also are included, $B_G^{G'}$ and $B_E^{\ddagger E}$.

*e) Investigation into Spline-Laplacian Transformation*

As is common practice, codes for the Spline-Laplacian transformations were applied to all electrodes measured on the scalp. However, the author thinks that the transformation should be applied to each Region of neocortex separately (e.g., visual, auditory, somatic, abstract, etc.), since each region typically participates in attention differently. This process is further tested in this project.

## III. ASA Algorithm

For parameters

$$\alpha_k^i \in [A_i, B_i] \tag{3}$$

sampling with the random variable $x^i$

$$x^i \in [-1,1]$$

$$\alpha_{k+1}^i = \alpha_k^i + x^i(B_i - A_i) \tag{4}$$

the default generating function is

$$g_T(x) = \prod_{i=1}^{D} \frac{1}{2\ln(1+1/T_i)(|x^i|+T_i)} \equiv \prod_{i=1}^{D} g_T^i(x^i) \tag{5}$$

in terms of "temperatures" for parameters [Ingber(1989)]

$$T_i = T_{i0}\exp(-c_i k^{1/D}) \tag{6}$$

The default ASA uses the same distribution for the annealing schedule for the acceptance function $h$ used for the generating function $g$.

The ASA default functions can be substituted with user-defined functions [Ingber(1993), Ingber (2012c)].

ASA has been applied to studies of COVID-19, fitting forms like $xS^y$, for variables $S$ and parameters $x$ and $y$, in the drifts and covariances of conditional probability distributions [Ingber(2021d)].

With over 150 OPTIONS, ASA permits robust tuning over many classes of nonlinear stochastic systems. These many OPTIONS help ensure that ASA can be used robustly across many classes of systems.

"QUENCHing" OPTIONS are widely used to control Adaptive Simulated Annealing. Fuzzy ASA algorithms additionally offer ways of controlling how QUENCHing OPTIONS are applied across many classes of problems.

For this project in paticular, the ASA_SAVE_BACKUP OPTIONS are useful, periodically saving information (including generated random numbers) sufficient to restart if ASA is interrupted, e.g., typically controlled by ASA_EXIT_ANYTIME OPTIONS, removing file "asa_exit_anytime" which permitting ASA to gracefully exit. E.g., ASA can remove "asa_exit_anytime" each 47 hours.

## IV. Path-Integral Methodology

*a) Generic Applications*

Many systems are defined by (a) Fokker-Planck/Chapman - Kolmogorov partial - differential equations, (b) Langevin coupled stochastic-differential equations, and (c) Lagrangian or Hamiltonian path-integrals. All three such systems of equations are equivalent mathematically, when limits of discretized variables are taken in the defined induced Riemannian geometry of the system due to nonlinear and time-dependent diffusions [Ingber(1982), Ingber(1983), Langouche ~al.(1982) Langouche, Roekaerts, Tirapegui, Schulman(1981)].

i. *Path-Integral Algorithm*

In classical physics, the path integral of N variables indexed by $i$,, at multiple times indexed by $\rho$, is defined in terms of its Lagrangian $L$:

$$P[q_t|q_{t_0}]dq(t) = \int \dots \int Dq \exp\left(-\min \int_{t_0}^{t} dt' L\right) \delta(q(t_0) = q_0)\delta(q(t) = q_t)$$

$$Dq = \lim_{u\to\infty} \prod_{\rho=1}^{u+1} g^{1/2} \prod_i (2\pi\Delta t)^{-1/2} dq_\rho^i$$

$$L(\dot{q}^i, q^i, t) = \frac{1}{2}(\dot{q}^i - g^i)g_{ii'}(\dot{q}^{i'} - g^{i'}) + R/6$$

$$g_{ii'} = (g^{ii'})^{-1}, g = \det(g_{ii'}) \tag{7}$$

The diagonal diffusion terms are $g^{ii}$ and the drift terms are $g^i$. If the diffusions terms are non-constant, there are additional terms in the drift, and in a Riemannian-curvature potential R/6 for dimension > 1 in



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the midpoint Stratonovich/Feynman discretization [Langouche ~al.(1982) Langouche, Roekaerts, Tirapegui].

The path-integral approach is useful to give mathematical support to physically intuitive variables in the Lagrangian $L$,

$$\text{Momentum: } \Pi^i = \frac{\partial L}{\partial(\partial q^i/\partial t)}$$

$$\text{Mass: } g_{ii'} = \frac{\partial L}{\partial(\partial q^i/\partial t)\partial(\partial q^{i'}/\partial t)}$$

$$\text{Force: } \frac{\partial L}{\partial q^i}$$

$$\text{F} = \text{ma: } \delta L = 0 = \frac{\partial L}{\partial q^i} - \frac{\partial}{\partial t}\frac{\partial L}{\partial(\partial q^i/\partial t)} \tag{8}$$

Canonical Momenta Indicators (CMI = $\Pi^i$) were used successfully in neuroscience [Ingber (1996), Ingber(1997), Ingber(1998)], combat analyses [Bowman Ingber(1997)], and financial markets [Ingber(1996), Ingber Mondescu(2001)].

The histogram algorithm numerically approximates sums of rectangles of height $P_i$ and width $\Delta q^i$ at points $q^i$. E.g., consider a one-dimensional system. In the prepoint Ito discretization, the path-integral representation is given by the kernel $G$ for each of its intermediate integrals, as

$$P(x;t+\Delta t) = \int \dagger dx' [g^{1/2}(2\pi\Delta t)^{-1/2}\exp(-L\,\Delta t)]P(x';t) = \int \dagger dx'\, G(x,x';\Delta t)P(x';t)$$

$$P(x;t) = \sum_{i=1}^{N} \dagger \pi(x-x^i)P_i(t) \text{ (t)}$$

$$\pi(x-x^i) = 1, (x^i - \tfrac{1}{2}\Delta x^{i-1}) \le x \le (x^i + \tfrac{1}{2}\Delta x^i); 0, \text{ otherwise} \tag{9}$$

This yields

$$P_i(t+\Delta t) = T_{ij}(\Delta t)P_j(t)$$

$$T_{ij}(\Delta t) = \frac{2}{\Delta x^{i-1} + \Delta x^i} \int_{x^i - \Delta x^{i-1}/2}^{x^i + \Delta x^i/2} dx \int_{x^j - \Delta x^{j-1}/2}^{x^j + \Delta x^j/2} dx' G(x,x';\Delta t \tag{10}$$

$T_{ij}$ is a banded matrix of the Gaussian short-time probability centered about the (possibly time-dependent) drift.

Explicit dependence of $L$ on time $t$ can be included. The mesh $\Delta q^i$ is strongly dependent on diagonal elements of the diffusion matrix, e.g.,

$$\Delta q^i \approx (\Delta t g^{ii})^{1/2} \tag{11}$$

The covariance of each variable is a (nonlinear) function all variables, presenting a rectangular mesh. Given that integration is a smoothing process [Ingber(1990)], fitting the data with integrals over the short-time probability distribution permits coarser meshes than the corresponding stochastic differential equation(s). The coarser resolution is appropriate for a numerical solution of the time-dependent path integral. Consideration of first and second moments yields conditions on the time and variable meshes [Wehner Wolfer(1983a)]. A scan of the time slice, $\Delta t \le \bar{L}^{-1}$ where $\bar{L}$ is the uniform/static Lagrangian, gives most important contributions to the probability distribution $P$.

ii. *Direct Kernel Evaluation*

Several projects have used this algorithm [Ingber Nunez(1995), Ingber ~al.(1996) Ingber, Srinivasan, Nunez, Ingber Wilson(1999), Wehner Wolfer(1983a), Wehner Wolfer(1983b), Wehner Wolfer(1987)]. 2-dimensional codes were developed for specific projects in Statistical Mechanics of Combat (SMC) [Ingber ~al.(1991)Ingber, Fujio, Wehner], SMNI [Ingber Nunez(1995)], and Statistical Mechanics of Financial Markets (SMFM) [Ingber(2000a)].

The 1-dimensional PATHINT code was generalized by the author to N dimensions. Also, a quantum generalization was made, changing all variables and functions to complex variables, encompassing about 7500 lines of PATHINT code. The N-dimensional code was developed for classical and quantum systems [Ingber(2016a), Ingber(2017a), Ingber(2017b)].

iii. *Monte Carlo vs Kernels*

Path-integral numerical applications often use Monte Carlo techniques [O'Callaghan Miller(2014)]. This includes the author's ASA code using ASA_SAMPLE OPTIONS [Ingber(1993)]. However, this project is concerned with time-sequential serial random shocks, which is not conveniently treated with Monte-Carlo/importance-sampling algorithms.

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*b) Quantum Path Integral Algorithms*

i. *Scaling Issues*

qPATHINT has been tested with shocks to $Ca^{2+}$ waves [Ingber(2017b)], using the basic code also used for for quantum options on quantum money [Ingber(2017a)]. This has illustrated computational scaling issues, further described in the Performance and Scaling Section.

ii. *Imaginary Time*

Imaginary-time Wick rotations permit imaginary-time to be transformed into real-time. Unfortunately, numerical calculations, after multiple foldings of the path integral, leaves no audit trail back to imaginary time to extract phase information (private communication with several authors of path-integral papers, including Larry Schulman on 18 Nov 2015) [Schulman(1981)].

## V. SMNI with Qpathint

This defines a process fitting EEG using SMNI with qPATHINT numerically calculating the Quantum path-integral between EEG epochs. At the beginning of each EEG epoch time is reset (t=0); the wave-function is decohered ("collapsed") by any EEG measurement. Until the end of any EEG epoch, there are multiple calls to SMNI functions to calculate the evolution of the Classical distribution. This replaces the author's Quantum path-integral closed-form time-dependent analytic solution.

## VI. Performance and Scaling

Code from a previous XSEDE grant "Electroencephalographic field influence on calcium momentum waves", is used for SMNI EEG fits. Code from a XSEDE previous XSEDE grant "Quantum path-integral qPATHTREE and qPATHINT algorithm", is used for qPATHINT runs.

*a) Scaling Estimates*

Estimates XSEDE.org's Expanse using 'gcc -O3'. Expanse is described in

https://www.sdsc.edu/support/user_guides/expanse

i. *SMNI*

100 ASA-iterations taking 7.12676s yields 0.0712676 sec/ASA-iteration over 2561 EEG epochs. With '-g' the total time is 29.9934s.

The number 2561 of EEG epochs is a region of high amplitude of times from 17 to 22 secs after the tasks began, defining epochs to be about 0.002 sec.

ii. *qPATHINT*

The qPATHINT code uses a variable mesh covering 1121 points along the diagonal, with a maximum off-diagonal spread of 27. Corners require considerable CPU time to take care of boundaries. Oscillatory wave functions require a large off-diagonal spread [Ingber(2017b)].

*dt=0.0002* secs requires 10 foldings of the distribution. This takes the code 0.0002 secs/qIteraction. With '-g' the code takes 0.004s to run.

iii. *Projected Hours/Service Units (SUs) for this Project*

nSubjects x 2 (switch Train/Test) yields a 24-array set of 1-node jobs.

ASA-iterations x (SMNI_time/ASA-iteration + nEpochs x qIterations x qPATHINT_time/qIteration)

yields 100,000 x (0.07 + 2500 x 10 x 0.0002) = 507,000 sec = 140 hr/run = 6 day/run.

Time for Gaussian quadratures calculations is not appreciable:

https://en.wikipedia.org/wiki/Gaussian_quadrature

Maximum duration of a normal job is 2 days. ASA has built in a simple way of ending jobs with printout required to restart, including sets of random numbers generated.

## VII. Closed-Form Calculations

Calculations on the Ookami supercomputer at StonyBrook.edu tested the path-integral derived analytic (closed-form) expression [Ingber(2018)] for astrocyte $Ca^{2+}$ wave synaptic interactions

$$< p >_{\psi*\psi} = m\frac{<r>_{\psi*\psi}}{t-t_0} = \frac{qA+p_0}{m^{1/2}|\Delta r|}\left(\frac{(\hbar t)^2+(m\Delta r^2)^2}{\hbar t+m\Delta r^2}\right)^{1/2} \quad (12)$$

Shocks were inserted into the mass $m$ of the wave packet of 1000 ions, using a random number generator that contributed up to 1% of the synaptic contribution due to $Ca^{2+}$ wave contributions. I.e., the mass was perturbed as $m = m(1-R) + Rr$, where $R = 0.1$ and $r$ is a random number between 0 and 1. The results are given in Table 1.

ASA was used with 200000 valid generated states for optimizations, then the modified Nelder-Mead code was used to sometimes gain extra precision with 5000 valid generated states. Training and Testing sets of data were used for 12 subjects, then the Training and Testing sets were exchanged. Runs were done with the added shocks and without these shocks. Each of the 48 runs took about 2 days on the Ookami supercomputer at StonyBrook.edu .

As commented previously [Ingber(2018)], "As with previous studies using this data, results sometimes give Testing cost functions less than the Training cost functions. This reflects on great differences in data, likely from great differences in subjects' contexts, e.g., possibly due to subjects' STM strategies only sometimes including effects calculated here."



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*Table 1:* Comparison using analytic derivation without and with shocks. The subject numbers are given as sNN, and a "-X" represents exchanging Training and Testing sets of EEG data. Under Results an "I" represents an improvement of a lower cost functions with shocks versus no-shocks. An "N" represents better results with no-shocks versus shocks. These results show 16 "I"s and 8 "N"s, clearly in favor of shocks.

| Sub | no-Shocks | Shocks | Results |
|---|---|---|---|
| s01 | 84.68593 | 84.34305 | I |
| s01-X | 118.8452 | 118.7469 | I |
| s02 | 68.48157 | 68.40058 | I |
| s02-X | 49.28883 | 49.13109 | I |
| s03 | 59.7605 | 59.724 | I |
| s03-X | 75.0323 | 74.92172 | I |
| s04 | 49.99637 | 50.00408 | N |
| s04-X | 63.24503 | 63.20287 | I |
| s05 | 66.17184 | 66.20236 | N |
| s05-X | 69.30881 | 69.54677 | N |
| s06 | 79.46274 | 79.65097 | N |
| s06-X | 61.53507 | 61.2894 | I |
| s07 | 68.26923 | 68.24647 | I |
| s07-X | 75.313 | 75.19828 | I |
| s08 | 43.82171 | 43.74269 | I |
| s08-X | 42.6704 | 42.66051 | I |
| s09 | 46.90326 | 46.84606 | I |
| s09-X | 24.21445 | 24.24822 | N |
| s10 | 53.19396 | 53.12375 | I |
| s10-X | 30.12276 | 30.04148 | I |
| s11 | 43.13081 | 43.17781 | N |
| s11-X | 50.20932 | 50.21808 | N |
| s12 | 44.24383 | 44.18135 | I |
| s12-X | 44.35697 | 44.36804 | N |

## VIII. Conclusion

A numerical path-integral methodology is used by SMNI to fit EEG to test quantum evolution of astrocyte-(re-)generated wave-packets of $\mathrm{Ca}^{2+}$ ions that suffer shocks due collisions and regeneration of free ions. SMNI is generalized with quantum variables using qPATHINT.

SMNI has fit experimental data, e.g., STM and EEG recordings under STM experimental paradigms. qPATHINT includes quantum scales in the SMNI model, evolving $\mathrm{Ca}^{2+}$ wave-packets with momentum $\mathrm{p}$ serial shocks, interacting with the magnetic vector potential $\mathrm{A}$ due to EEG, via the $(\mathrm{p} + q\mathrm{A})$ interaction at each node at each time slice $t$, in time with experimental EEG data.

Published pilot studies have given rationales for developing this particular quantum path-integral algorithm, to study serial random shocks that occur in many systems. This quantum version can be used for many quantum systems, which is increasingly important as experimental data is increasing at a rapid pace for many quantum systems.

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Note that in accordance with common practice, standalone website URLs are not necessarily referenced at the end, but often appear within the body of text. E.g., see
https://libanswers.snhu.edu/faq/8627
https://www.scribbr.com/apa-examples/cite-a-website/
https://libguides.css.edu/APA7thEd/Webpages

## References Références Referencias

1. [Alakus ~al.(2020) Alakus, Gonen, Turkoglu] Alakus, T., Gonen, M., Turkoglu, I. (2020). Database for an emotion recognition system based on EEG signals andvarious computer games — GAMEEMO. *Biomedical Signal Processing and*



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*Control* 60 (101951), 1–12. https://doi.org/10.1016/j. bspc.2020.101951.
2. [Asher(2012)] Asher, J. (2012 ). Brain's code for visual working memory deciphered in monkeys NIH-funded study. Technical Report NIH Press Release, NIH, Bethesda, MD. http://www.nimh.nih.gov/news/science-news/2012/in-sync-brain-waves-hold-memory-of-objects-just-seen.shtml.
3. [Benedetti ~al.(2019) Benedetti, Lloyd, Sack, Fiorentini] Benedetti, M., Lloyd, E., Sack, S., Fiorentini, M. (2019). Parameterized quantum circuits as machine learning models. Quantum Science and Technology 4 (4). https://doi.org/10.1088/2058-9565/ab5944.
4. [Bowman Ingber (1997)] Bowman, M., Ingber, L. (1997). Canonical momenta of nonlinear combat. In *Proceedings of the 1997 Simulation Multi-Conference, 6-10 April 1997, Atlanta, GA*, Society for Computer Simulation, San Diego, CA. 1–6. https://www.ingber.com/combat97_cmi.pdf.
5. [Burgarth ~al.(2018) Burgarth, Facchi, Nakazato, Pascazio, Yuasa] Burgarth, D., Facchi, P., Nakazato, H., Pascazio, S., Yuasa, K. (2018). Quantum zeno dynamics from general quantum operations. Technical Report arXiv: 1809.09570v1 [quant-ph], Aberystwyth U., Aberystwyth, UK .
6. [Chakrabarti ~al.(2020) Chakrabarti, Krishnakumar, Mazzola, Stamatopoulos, Woerner, Zeng] Chakrabarti, S., Krishnakumar, R., Mazzola, G., Stamatopoulos, N., Woerner, S., Zeng, W. (2020). A threshold for quantum advantage in derivative pricing. Technical Report arXiv: 2012.03819v2 [quant-ph] , Goldman Sachs, New York, NY.
7. [Citi ~al. (2010) Citi, Poli, Cinel] Citi, L., Poli, R., Cinel, C. (2010). Documenting, modelling and exploiting P300 amplitude changes due to variable target delays in Donchin's speller. *Journal of Neural Engineering* 7 (056006), 1–21. https://dx.doi.org/10.1088/1741-2560/7/5/056006.
8. [Conway Kochen (2006)] Conway, J., Kochen, S. (2006). The free will theorem. Technical Report arXiv: quant-ph/0604079 [quant-ph], Princeton U, Princeton, NJ.
9. [Conway Kochen(2009)] Conway, J., Kochen, S. (2009). The strong free will theorem. *Notices of the American Mathematical Society* 56 (2), 26–232 .
10. [Ericsson Chase(1982)] Ericsson, K., Chase, W. (1982). Exceptional memory. *American Scientist* 70, 607–615.
11. [Facchi ~al. (2004) Facchi, Lidar, Pascazio] Facchi, P., Lidar, D., Pascazio, S. (2004). Unification of dynamical decoupling and the quantum zeno effect. Physical Review A 69 (032314), 1–6 .
12. [Facchi Pascazio (2008)] Facchi, P., Pascazio, S. (2008). Quantum zeno dynamics: mathematical and physical aspects. *Journal of Physics A* 41 (493001), 1–45 .
13. [Giacosa Pagliara (2014)] Giacosa, G., Pagliara, G. (2014). Quantum zeno effect by general measurements. *Physical Review A* 052107, 1–5.
14. [Goldberger ~al.(2000) Goldberger, Amaral, Glass, Hausdorff, Ivanov, Mark, Mietus, Moody, Peng, Stanley] Goldberger, A., Amaral, L., Glass, L., Hausdorff, J., Ivanov, P., Mark, R., Mietus, J., Moody, G., Peng, C.K., Stanley, H. (2000). Physio Bank, PhysioToolkit, and Physio Net: components of a new research resource for complex physiologic signals. *Circulation* 101 (23). e215–e220. http://circ.ahajournals.org/cgi/content/full/101/23/e215.
15. [Hick (1952)] Hick, W. (1952). On the rate of gains of information. Quarterly Journal Experimental Psychology 34 (4), 1–33.
16. [Ingber ~al.(2001) Ingber, Chen, Mondescu, Muzzall, Renedo] Ingber, L., Chen, C., Mondescu, R., Muzzall, D., Renedo, M. (2001). Probability tree algorithm for general diffusion processes. *Physical Review E* 64 (5), 056702–056707. https://www.ingber.com/path01_pathtree.pdf.
17. [Ingber ~al.(1991)Ingber, Fujio, Wehner] Ingber, L., Fujio, H., Wehner, M. (1991). Mathematical comparison of combat computer models to exercise data. *Mathematical Computer Modelling* 15 (1), 65–90. https://www.ingber.com/combat91_data.pdf.
18. [Ingber Mondescu(2001)] Ingber, L., Mondescu, R. (2001). Optimization of trading physics models of markets. *IEEE Transactions Neural Networks* 12 (4), 776–790. Invited paper for special issue on Neural Networks in Financial Engineering. https://www.ingber.com/markets01_optim_trading.pdf.
19. [Ingber Nunez (1995)] Ingber, L., Nunez, P. (1995). Statistical mechanics of neocortical interactions: High resolution path-integral calculation of short-term memory. Physical Review E 51(5), 5074–5083. https://www.ingber.com/smni95_stm.pdf .
20. [Ingber Nunez (2010)] Ingber, L., Nunez, P. (2010). Neocortical dynamics at multiple scales: EEG standing waves, statistical mechanics, and physical analogs. *Mathematical Biosciences* 229, 160–173. https://www.ingber.com/smni10_multiple_scales.pdf
21. [Ingber ~al.(2014) Ingber, Pappalepore, Stesiak] Ingber, L., Pappalepore, M., Stesiak, R. (2014). Electroencephalographic field influence on calcium momentum waves. *Journal of Theoretical Biology* 343, 138–153. https://www.ingber.com/smni14_eeg_ca.pdf and https://doi.org/10.1016/j.jtbi.2013.11.002.
22. [Ingber ~al.(1996) Ingber, Srinivasan, Nunez] Ingber, L., Srinivasan, R., Nunez, P. (1996). Path-integral evolution of chaos embedded in noise: Duffing neocortical analog. *Mathematical*



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*Computer Modelling* 23 (3), 43–53. https:// www.ingber.com/path96_duffing.pdf.

23. [Ingber Wilson (1999)] Ingber, L., Wilson, J. (1999). Volatility of volatility of financial markets. Mathematical Computer Modelling 29 (5), 39–57. https://www.ingber.com/markets99_vol.pdf.
24. [Ingber Wilson(2000)] Ingber, L., Wilson, J. (2000). Statistical mechanics of financial markets: Exponential modifications to black-scholes. *Mathematical Computer Modelling* 31 (8/9), 167–192. https://www.ingber.com/markets00_exp.pdf.
25. [Ingber(1981)] Ingber, L. (1981). Towards a unified brain theory. *Journal Social Biological Structures* 4, 211–224. https://www.ingber.com/smni81_unified.pdf.
26. [Ingber(1982)] Ingber, L. (1982). Statistical mechanics of neocortical interactions. i. basic formulation. *Physica D* 5, 83–107. https://www.ingber.com/smni82_basic.pdf.
27. [Ingber(1983)] Ingber, L. (1983). Statistical mechanics of neocortical interactions. dynamics of synaptic modification. *Physical Review A* 28, 395–416. https://www.ingber.com/smni83_dynamics.pdf.
28. [Ingber(1984)] Ingber, L. (1984). Statistical mechanics of neocortical interactions. derivation of short-term-memory capacity. *Physical Review A* 29, 3346–3358. https://www.ingber.com/smni84_stm.pdf.
29. [Ingber(1985a)] Ingber, L. (1985a). Statistical mechanics of neocortical interactions: Stability and duration of the 7+-2 rule of short-term-memory capacity. *Physical Review A* 31, 1183–1186. https://www.ingber.com/smni85_stm.pdf.
30. [Ingber(1985b)] Ingber, L. (1985b). Statistical mechanics of neocortical interactions. EEG dispersion relations. *IEEE Transactions in Biomedical Engineering* 32, 91–94. https://www.ingber.com/smni85_eeg.pdf .
31. [Ingber(1989)] Ingber, L. (1989). Very fast simulated re-annealing. *Mathematical Computer Modelling* 12 (8), 967–973. https://www.ingber.com/asa89_vfsr.pdf.
32. [Ingber(1990)] Ingber, L. (1990). Statistical mechanical aids to calculating term structure models. *Physical Review A* 42 (12), 7057–7064. https://www.ingber.com/markets90_interest.pdf.
33. [Ingber(1993)] Ingber, L. (1993). Adaptive simulated annealing (ASA). Technical Report Global optimization C-code, Caltech Alumni Association, Pasadena, CA. https://www.ingber.com/#ASA-CODE .
34. [Ingber(1994)] Ingber, L. (1994). Statistical mechanics of neocortical interactions: Path-integral evolution of short-term memory. *Physical Review E* 49 (5B), 4652–4664. https://www.ingber.com/smni94_stm.pdf.
35. [Ingber(1995)] Ingber, L. (1995). Statistical mechanics of neocortical interactions: Constraints on 40 hz models of short-term memory. *Physical Review E* 52 (4), 4561–4563. https://www.ingber.com/smni95_stm40hz.pdf.
36. [Ingber(1996)] Ingber, L. (1996). Canonical momenta indicators of financial markets and neocortical EEG. In Amari, S.I., Xu, L., King, I., Leung, K.S. (Eds.), *Progress in Neural Information Processing*, Springer, New York. 777–784. Invited paper to the 1996 International Conference on Neural Information Processing (ICONIP'96), Hong Kong, 24-27 September 1996. ISBN 981-3083-05-0. https://www.ingber.com/markets96_momenta.pdf.
37. [Ingber(1997)] Ingber, L. (1997). Statistical mechanics of neocortical interactions: Applications of canonical momenta indicators to electroence phalography. *Physical Review E* 55 (4), 4578–4593. https://www.ingber.com/smni97_cmi.pdf.
38. [Ingber(1998)] Ingber, L. (1998). Statistical mechanics of neocortical interactions: Training and testing canonical momenta indicators of EEG. *Mathematical Computer Modelling* 27 (3), 33–64. https://www.ingber.com/smni98_cmi_test.pdf .
39. [Ingber(1999)] Ingber, L. (1999). Statistical mechanics of neocortical interactions: Reaction time correlates of the g factor. *Psycholoquy* 10 (068). Invited commentary on The g Factor: The Science of Mental Ability by Arthur Jensen. https://www.ingber.com/smni99_g_factor.pdf and http://www.cogsci.ecs.soton.ac.uk/cgi/psyc/newpsy?10.068.
40. [Ingber(2000a)] Ingber, L. (2000a). High-resolution path-integral development of financial options. *Physica A* 283 (3-4), 529–558. https://www.ingber.com/markets00_highres.pdf.
41. [Ingber(2000b)] Ingber, L. (2000b). Statistical mechanics of neocortical interactions: EEG eigenfunctions of short-term memory. *Behavioral and Brain Sciences* 23 (3), 403–405. Invited commentary on Toward a Quantitative Description of Large-Scale Neocortical Dynamic Function and EEG, by P.L. Nunez. https://www.ingber.com/smni00_eeg_stm.pdf.
42. [Ingber(2011)] Ingber, L. (2011). Computational algorithms derived from multiple scales of neocortical processing. In Pereira, A., Massad, E., Bobbitt, N. (Eds.), *Pointing at Boundaries: Integrating Computation and Cognition on Biological Grounds*, Springer, New York. 1–13. Invited Paper. https://www.ingber.com/smni11_cog_comp.pdf and https://doi.org/10.1007/s12559-011-9105-4.
43. [Ingber(2012a)] Ingber, L. (2012a). Columnar EEG magnetic influences on molecular development of short-term memory. In Kalivas, G., Petralia, S. (Eds.), *Short-Term Memory: New Research*, Nova, Hauppauge, NY. 37–72. Invited Paper. https://www.ingber.com/smni11_stm_scales.pdf.



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44. [Ingber(2012b)] Ingber, L. (2012b). Influence of macrocolumnar EEG on ca waves. *Current Progress Journal* 1 (1), 4–8. https://www.ingber.com/smni12_vectpot.pdf.
45. [Ingber(2012c)] Ingber, L. (2012c). Adaptive simulated annealing. In Oliveira, H., Petraglia, A., Ingber, L., Machado, M., Petraglia, M. (Eds.), *Stochastic global optimization and its applications with fuzzy adaptive simulated annealing*, Springer, New York. 33–61. Invited Paper. https://www.ingber.com/asa11_options.pdf.
46. [Ingber(2015)] Ingber, L. (2015). Calculating consciousness correlates at multiple scales of neocortical interactions. In Costa, A., Villalba, E. (Eds.), *Horizons in Neuroscience Research*, Nova, Hauppauge, NY. 153–186. ISBN 978-1-63482-632-7. Invited paper. https://www.ingber.com/smni15_calc_conscious.pdf.
47. [Ingber(2016a)] Ingber, L. (2016a). Path-integral quantum PATHTREE and PATHINT algorithms. *International Journal of Innovative Research in Information Security* 3 (5), 1–15. https://www.ingber.com/path16_quantum_path.pdf.
48. [Ingber(2016b)] Ingber, L. (2016b). Statistical mechanics of neocortical interactions: Large-scale EEG influences on molecular processes. *Journal of Theoretical Biology* 395, 144–152. https://www.ingber.com/smni16_large-scale_molecular.pdf and https://doi.org/10.1016/j.jtbi.2016.02.003.
49. [Ingber(2017a)] Ingber, L. (2017a). Options on quantum money: Quantum path-integral with serial shocks. *International Journal of Innovative Research in Information Security* 4 (2), 7–13. https://www.ingber.com/path17_quantum_options_shocks.pdf.
50. [Ingber(2017b)] Ingber, L. (2017b). Evolution of regenerative ca-ion wave-packet in neuronal-firing fields: Quantum path-integral with serial shocks. *International Journal of Innovative Research in Information Security* 4 (2), 14–22. https://www.ingber.com/path17_quantum_pathint_shocks.pdf.
51. [Ingber(2017c)] Ingber, L. (2017c). Quantum path-integral qPATHINT algorithm. *The Open Cybernetics Systemics Journal* 11, 119–133. https://www.ingber.com/path17_qpathint.pdf and https://doi.org/10.2174/1874110X01711010119.
52. [Ingber(2018)] Ingber, L. (2018). Quantum calcium-ion interactions with EEG. *Sci* 1 (7), 1–21. https://www.ingber.com/smni18_quantumCaEEG.pdf and https://doi.org/10.3390/sci1010020.
53. [Ingber(2021a)] Ingber, L. (2021a). Revisiting our quantum world. In Hooke, A. (Ed.), *Technological Breakthroughs and Future Business Opportunities in Education, Health, and Outer Space*, IGI Global, Hershey, PA. 1–16. https://www.ingber.com/quantum20_techcast.pdf.
54. [Ingber(2021b)] Ingber, L. (2021b). Quantum calcium-ion affective influences measured by EEG. *International Journal Physics and Space Science*, (to be published) https://www.ingber.com/quantum20_affective.pdf.
55. [Ingber(2021c)] Ingber, L. (2021c). Hybrid classical-quantum computing: Applications to statistical mechanics of financial markets. Technical Report 2021: CQCA, Physical Studies Institute, Ashland, OR. https://www.ingber.com/markets21_hybrid_smfm.pdf.
56. [Ingber(2021d)] Ingber, L. (2021d). Forecasting COVID-19 with importance-sampling and path-integrals. *WSEAS Transactions on Biology and Biomedicine*, (to be published) https://www.ingber.com/asa20_covid.pdf.
57. [Jensen(1987)] Jensen, A. (1987). Individual differences in the hick paradigm. In Vernon, P. (Ed.), *Speed of Information-Processing and Intelligence*, Ablex, Norwood, NJ. 101–175.
58. [Kozlowski ~al.(2015) Kozlowski, Caballero Benitez, Mekhov] Kozlowski, W., Caballero-Benitez, S., Mekhov, I. (2015). Non-hermitian dynamics in the quantum zeno limit. Technical Report arXiv1510.04857 [quant-ph], U Oxford, Oxford, UK .
59. [Langouche ~al.(1982) Langouche, Roekaerts, Tirapegui] Langouche, F., Roekaerts, D., Tirapegui, E. (1982). *Functional Integration and Semiclassical Expansions*. Reidel, Dordrecht, The Netherlands.
60. [Muller ~al. (2016) Muller, Gherardini, Caruso] Muller, M., Gherardini, S., Caruso, F. (2016). Quantum zeno dynamics through stochastic protocols. Technical Report arXiv: 1607.08871v1 [quant-ph], U Florence, Florence, Italy.
61. [Murakami Okad (2006)] Murakami, S., Okada, Y.(2006). Contributions of principal neocortical neurons to magnetoencephalography and electroencephalography signals. Journal of Physiology 575 (3), 925–936.
62. [Nunez ~al.(2013) Nunez, Srinivasan, Ingber] Nunez, P., Srinivasan, R., Ingber, L. (2013). Theoretical and experimental electrophysiology in human neocortex: Multiscale correlates of conscious experience. In Pesenson, M. (Ed.), *Multiscale Analysis and Nonlinear Dynamics: From genes to the brain*, Wiley, New York. 149–178. https://doi.org/10.1002/9783527671632.ch06.
63. [Nunez Srinivasan (2006)] Nunez, P., Srinivasan, R. (2006). *Electric Fields of the Brain: The Neurophysics of EEG, 2nd Ed*. Oxford University Press, London.
64. [O'Callaghan Miller (2014)] O'Callaghan, M., Miller, B. (2014). Path integral monte carlo on a lattice: Extended states. *Physical Review E* 89 (042124), 1–19. https://dx.doi.org/10.1103/PhysRevE.89.04212
65. [Patil ~al.(2015) Patil, Chakram, Vengalattore] Patil, Y., Chakram, S., Vengalattore, M. (2015). Measurement-induced localization of an ultracold




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lattice gas. *Physical Review Letters* 115 (140402), 1–5. http://link.aps.org/doi/10.1103/PhysRevLett.115.140402.
66. [Preskill (2015)] Preskill, J. (2015). Quantum mechanics. Technical Report Lecture Notes, Caltech, Pasadena, CA. http://www.theory.caltech.edu/people/preskill/ph219/.
67. [Ross (2012)] Ross, W. (2012). Understanding calcium waves and sparks in central neurons. *Nature Reviews Neuroscience* 13, 157–168.
68. [Salazar ~al.(2012) Salazar, Dotson, Bressler, Gray] Salazar, R., Dotson, N., Bressler, S., Gray, C.(2012). Content-specific fronto-parietal synchronization during visual working memory. Science 338 (6110), 1097–1100. https://dx.doi.org/10.1126/science.1224000.
69. [Schulman(1981)] Schulman, L. (1981). *Techniques and Applications of Path Integration*. J. Wiley & Sons, New York.
70. [Schulten (1999)] Schulten, K. (1999). Quantum mechanics. Technical Report Lecture Notes, U. Illinois, Urbana, IL. http://www.ks.uiuc.edu/Services/Class/PHYS480/.
71. [Wehner Wolfer (1983a)] Wehner, M., Wolfer, W. (1983a). Numerical evaluation of path-integral solutions to fokker-planck equations. I. *Physical Review A* 27, 2663–2670 .
72. [Wehner Wolfer (1983b)] Wehner, M., Wolfer, W. (1983b). Numerical evaluation of path-integral solutions to fokker-planck equations. II. restricted stochastic processes. *Physical Review A* 28, 3003–3011.
73. [Wehner Wolfer (1987)] Wehner, M., Wolfer, W. (1987). Numerical evaluation of path integral solutions to fokker-planck equations. III. time and functionally dependent coefficients. *Physical Review A* 35, 1795–1801.
74. [Wu ~al.(2012) Wu, Wang, Yi] Wu, S., Wang, L., Yi, X. (2012). Time-dependent decoherence-free subspace. *Journal of Physics A* 405305, 1–11.
75. [Zhang Simon (1985)] Zhang, G., Simon, H. (1985). STM capacity for chinese words and idioms: Chunking and acoustical loop hypotheses. *Memory & Cognition* 13, 193–201.



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# Impact of the Bolsa Família Program on Children and Adolescents' Educational Level

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*Abstract-* This study aims to analyze the impacts of the Programa Bolsa Família (PBF) on educational indicators for Brazilian children and adolescents aged six to seventeen. The methodology used to investigate the impacts of the PBF was the Propensity Score Matching method according to data from the 2019 National Continuous Household Sample Survey. The results of the impact of the PBF indicated that beneficiaries are more likely to attend school and less likely to fall behind in school and drop out. It was also possible to observe that the program shows a greater impact on the older-age group, boys, non-whites and students from rural areas in relation to school attendance and dropout. Regarding the results of the impact on school delay, they are also higher for the older-age group, especially for girls, in the Central-West and Northeast regions and in the rural area. Thus, there is confirmation of the hypothesis that the PBF has impacts on educational indicators, improving the performance of its beneficiaries. The contribution is the analysis of the impact of the current PBF, after sixteen years of its implementation, the results of the work suggest the relevance of the cash transfer program as, in the absence of the PBF, school evasion and delay would be at levels even bigger.

*Keywords:* *bolsa família program; educational indicators; poverty; propensity score matching.*

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# Impact of the Bolsa Família Program on Children and Adolescents' Educational Level

Juliane Borchers [α] & Marina Silva da Cunha [σ]

*Abstract-* This study aims to analyze the impacts of the *Programa Bolsa Família* (PBF) on educational indicators for Brazilian children and adolescents aged six to seventeen. The methodology used to investigate the impacts of the PBF was the Propensity Score Matching method according to data from the 2019 National Continuous Household Sample Survey. The results of the impact of the PBF indicated that beneficiaries are more likely to attend school and less likely to fall behind in school and drop out. It was also possible to observe that the program shows a greater impact on the older-age group, boys, non-whites and students from rural areas in relation to school attendance and dropout. Regarding the results of the impact on school delay, they are also higher for the older-age group, especially for girls, in the Central-West and Northeast regions and in the rural area. Thus, there is confirmation of the hypothesis that the PBF has impacts on educational indicators, improving the performance of its beneficiaries. The contribution is the analysis of the impact of the current PBF, after sixteen years of its implementation, the results of the work suggest the relevance of the cash transfer program as, in the absence of the PBF, school evasion and delay would be at levels even bigger.

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## I. Introduction

Poverty is an economic and social development problem in countries and still remains an important issue in many of them (Bourguignon & Chakravarty, 2003). In Brazil, the incidence of poverty was reduced by almost 68% between 1990 and 2018, going from 20.6% to 6.5% (World Bank, 2018). However, the country still has a significant percentage of the population in poverty and extreme poverty. In addition, the expectation of years of schooling for Brazil is 15.4 years, according to the 2019 United Nations Development Program (UNDP) report, being a higher level than the one registered for the world, which is 12.7 years, but still lower than for some South American neighbors, as Argentina (17.6 years old), Uruguay (16.3 years old) and Chile (16.5 years old).

These high levels of poverty are problematic not only in the social area, as high inequality is associated with the poverty trap, but also highlight a negative relationship between inequality and economic growth (Perry et al., 2006; Myrdal, 1968). Economic development, income inequality and poverty are often associated with educational differences. Individuals from poor families enter the labor market with lower educational level than richer families and, as a result, earn lower wages. When families with lower income have restrictions in the credit market and, therefore, cannot anticipate the income needed to invest in their children's education, it creates a cycle in which poverty is carried from generation to generation. Thus, one of the solutions raised by the economic literature to reduce income inequality and also break the intergenerational transmission of poverty is the promotion of policies that increase the accumulation of human capital in the poorest families (Heckman & Masterov, 2007), as education has the capacity to break vicious circles (Nurkse, 1969; Myrdal, 1968), boost the process of economic growth and productive restructuring (Kuznets, 1955) and generate the processes of access to the labor market, gains productivity and wage improvements (Becker, 1964; Mincer, 1958). Access to education has been evidenced alongside public policies that favor the reduction of income inequality and poverty, such as income transfer policies like the Bolsa Família Program.

Thus, the fight against poverty requires specific actions capable of interrupting this trap between generations, among which the role of targeted cash transfer programs stands out. Aimed at needy families, the objective of these policies is to eliminate and/or alleviate, in the short term, the difficulties caused by the condition of poverty. Furthermore, by enabling direct income transfer with conditionalities, such as school attendance and medical care, the programs combat two aspects that characterize the reproduction of the intergenerational cycle of poverty: they ensure the minimum level of subsistence income for poor families and preserve the attainment of human capital of its beneficiaries.

These cash transfer programs were widespread in underdeveloped countries, mainly after the 1990s. In Latin America, conditional cash transfer programs were initially carried out in Mexico (Oportunidades, 1997), Chile (Chile Solidario, 2004), Argentina (*Asignación Universal Por Hijo*, 2009), Uruguay (*Nuevo Régimen de Asignaciones Familiares*, 2008) and Brazil (Bolsa Família Program, 2003).

On October 20th, 2003, Brazil created the PBF with the objective of reducing poverty and, consequently, income inequality, as it transfers income

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to a group of eligible families, establishing some conditionalities that encompass basic rights, such as education and health. The purpose of the program's conditionalities is to ensure the offer of basic actions to health and education services and to social policies of a more structural nature (microcredit, cooperativism, literacy, etc.), as well as enhance the improvement of quality of life of families and contribute to their social inclusion. The number of families benefiting from the PBF grew progressively between 2003 and 2006, when it reached 11 million families; in 2011, it increased to 13.8 million beneficiary families (Paiva et al., 2013). At the end of 2019, the program served approximately 13.2 million families, which represents 19.13% of the total of 69 million Brazilian families (Ministry of Social Development).

There is currently an extensive literature that estimates the impact of these cash transfer programs highlighted above on different variables of interest. Studies suggest that there are no negative incentives to work (Parker & Skoufias, 2000; Larrañaga et al., 2009; Machado et al., 2012; Martínez & Trajtenberg, 2016). Regarding child labor, the results show very clear negative impacts of the programs on participation in the child labor market (Skoufias & McClafferty, 2001; Salvia et al., 2015). In the health area, it was found that the participants of the Oportunidades and Chile Solidario Program are experiencing improvements in health (Gertler, 2000; Galasso, 2006). In the area of food security, Progresa also had important impacts on food consumption, with higher calorie consumption and a more diversified diet (Hoddinott et al., 2000). For the Bolsa Família Program (Brazil) in these same areas, the works by Jannuzzi et al. (2012), Soares et al. (2010), Marinho and Mendes (2013), Barbosa and Corseuil (2014) and De Brauw et al. (2015) found the same results obtained in the other conditional cash transfer programs presented above.

Therefore, the objective of this work is to evaluate the impact of the Bolsa Família Program (PBF) on educational indicators, attendance, dropout and school delay, of beneficiary children and adolescents, from six to seventeen years old, according to the most recent data made available by the National Survey by Continuous Household Sample (PNADC) of 2019 for the whole country, being able to even analyze the dimension of impacts regionally, using the method of Propensity Score Matching, since the PBF is a public policy aimed at improving access to education in the country.

## II. Cash Transfer Programs and Impacts on Education

The works of Schultz (2000a), Behrman et al. (2001), Behrman et al. (2009) and Parker (2011) found that the Oportunidades program had positive and significant impacts on the education and school enrollment of beneficiaries. For the Chile Solidario program, the results of the study by Galasso (2006) indicate significant and consistent increases in the enrollment of children and adolescents participating in the program in relation to non-participation in the program. Participation in the *Nuevo Régimen de Asignaciones Familiares* program represented an increase in the service provided by the educational center for adolescents aged twelve to seventeen years old. In terms of school permanence, it appears that the greatest impact is for adolescents between sixteen and seventeen years old (Machado et al., 2012). The *Asignación Universal por Hijo* program shows a reduction in school dropout, and at the aggregate level, this impact was more favorable for men than for women and greater for adolescents aged sixteen and seventeen when compared to those aged fourteen and fifteen (Salvia et al., 2015; Jiménez & Jiménez, 2016).

There are studies that seek to explore the effects of the PBF on education. The work of Pellegrina (2011) sought to assess the impact of the PBF on school performance variables on benefited students in the State of São Paulo and found a reduction in school dropout of around 20%, a reduction of 3% on absences and no change in student performance on report card or standardized exams. The work by Oliveira and Soares (2013) analyzed the impact on school failure using the Cadastro Único database of 2008 and 2009, performing a logistic regression, and found out that the program has a significant impact on children's progression, although it was relatively modest: when simulating the probability of predicted repetition, it is 14.6% for non-beneficiaries belonging to the Cadastro Único against 13.2% for beneficiaries.

There are also studies that analyze the relationship between education and the labor market, observing the impact of the PBF on the relationship between school and youth work. The work by Silveira et al. (2014) using the 2010 Demographic Census through the Propensity Score Weighting, found evidence that program beneficiaries have greater possibilities of studying than non-beneficiaries, being 80% against 70% when considering for young people between ten and eighteen years old. The study by Pedrozo (2007) using a multinomial logit model built through the National Household Sample Survey (PNAD) of 2004 observed a reduction in the decision to study and work, while those who only study grew significantly. And it concluded that there was a decrease of about 2/3 in the number of children between ten and fifteen years of age who do not study, and this effect is even greater for the lower income groups.

In addition to works that assess the impact of the program on school performance, there are also works that analyze the impact of the program on school attendance, as in the case of the work by Neto et al.

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(2020), which aims to investigate the impact of the PBF on educational indicators, enrollment rate and school gap, of children aged six to seventeen, but only for the states and mesoregions of the Northeast region, from the Propensity Score Matching method and from the 2010 Demographic Census information. The results showed that the PBF has a significant impact on the enrollment rate. Furthermore, it was observed that the impact is higher for adolescents between fifteen and seventeen years old. However, for school lag, the effects in general were not significant.

The study by Chitolina et al. (2013a) also verified a positive and significant effect of the PBF on school attendance and that this effect was greater among young males and the youngest children of families, considering the information from the 2006 and 2009 PNAD through the estimator of difference in differences. Kern et al. (2017) aimed to assess the impact of the PBF on school enrollment on educational indicators such as progression, repetition and dropout of children aged six to seventeen in Brazil and large regions. It was observed through longitudinal panel data at the individual level, based on the AIBF I and AIBF II data[1], that the PBF did not impact the school enrollment of children from 2005 to 2009 when it was disaggregated by gender. However, the PBF increased the probability of children enrollment, especially in rural areas of the North and Central-West region. Regarding progression and repetition, the program impacted children aged fifteen to seventeen from the rural area of the Northeast region and in the urban area of the South/Southeast, expanding progression and reducing the probability of repetition. The PBF also reduces the likelihood of children in the rural area of the Northeast to drop out of school.

The work by Cacciamali et al. (2010), which analyzes the impact of the PBF on the incidence of child labor and school attendance by children, using microdata from the 2004 PNAD with a bivariate probit model, found that the PBF increases the school attendance of children. However, they found perverse effects on the incidence of child labor as they obtained results that, for the poorest children, the probability of its occurrence is higher. Another study that analyzed the impact of the PBF on school attendance is the one by Melo and Duarte (2010), who evaluated the impact of the program on the school attendance of children and adolescents aged five to fourteen in family farms in the states of Pernambuco, Ceará, Sergipe and Paraíba. The authors used primary data (field research) and secondary data (PNAD, 2005) to obtain estimates of the Propensity Score. The results of the study indicate, in general, that the program raises the school attendance of these children in the range of 5.4 to 5.9 percentage points.

However, Ribeiro and Cacciamali's work (2012) did not find significant differences between beneficiary and non-beneficiary families in relation to school attendance indicators and age-grade gap when using data from the 2006 PNAD and the Propensity Score Matching method. Cavalcanti et al. (2013), who verified the impact of the PBF on families in the Northeast of Brazil using PNAD data from 2004 and 2006, applied to the Propensity Score Matching methodology, observed that there were 19% more children and young people attending school in families beneficiaries in a situation of poverty in 2004. This result, however, is proportionally lower (15%) in 2006, suggesting that the program has a positive impact on the number of children and young people who attend school, but this increase occurs at decreasing rates.

Thus, it does not seem to be a consensus regarding both the direction and the size of the impact of the PBF on variables that measure school performance among beneficiary families as the aforementioned works show positive, negative or non-significant results in these variables, since it directly impacts on child labor and on the persistence of poverty. However, these results change in relation to the location analyzed, the database and the methodology used in the studies. In addition, these works analyzed an initial period of the PBF, from 2004 to 2010.

## III. Methodology

The impact analysis of the PBF, like any other public policy, is not a simple task due to the impossibility of observing the same individual in different situations, that is, as treated and not treated. Thus, it is necessary to find a control group formed by those who do not receive the benefit but have similar characteristics to the beneficiaries. In this work, the Propensity Score Matching (PSM) is used as a methodological approach, seeking to obtain more robust estimates due to the problem of self-selection bias present in more traditional approaches.

### *a) Propensity Score Matching*

Propensity Score Matching (PSM) is an econometric method that aims to find control groups comparable to treatment groups by matching them by their observable characteristics. This method emerged to solve the problem of selection bias that some methodologies encountered when making this comparison, as they did not have a common support between among groups. In other words, "Propensity Score" estimates, through a logit/probit regression, the probability of belonging to the treatment group and "Matching" associates the untreated units with a more approximate propensity score so that the comparison is

[1] Impact Assessment of the Bolsa Família Program (AIBF), a database that aims to monitor beneficiaries of the PBF, developed under the command of the Ministry of Social Development and Fight against Hunger in 2005 and 2009.



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the best possible. Originally developed by Rosenbaum and Rubin (1983), the propensity score is defined as the conditional probability of receiving a treatment, given pretreatment characteristics:

$$p(X)=Pr\left(B=\frac{1}{X}\right)=E\left(\frac{D}{X}\right) \quad (1)$$

Where $Y_{1i}$ is the result variable when family $i$ participates in the program and $Y_{0i}$ denotes the result variable when family $i$ does not participate in the PBF. $X$ is a vector of observable household characteristics where D is an indicator of exposure of the treated (0 [zero] for untreated and 1 [one] for treated). Thus, the average of the treatment effect on the treated (*ATT*) is given by:

$$\tau = E\{\Delta \mid D_i=1\}=E[\{Y_{1i}-Y_{0i} \mid D_i=1, p(X_i)\}] \therefore$$

$$\tau = \mathrm{E}[\{Y_{1i}|D_i=1, p(X_i)\} - \{Y_{0i}|D_i=0, p(X_i)\}|\mathrm{D_i}=1] \quad (2)$$

It is worth noting that a propensity score estimate is not enough to estimate the *ATT* of equation (2), it is necessary to combine it with the matching because the probability of observing two units with exactly the same propensity score is, in principle, zero, given that $p(X)$ is a continuous variable. In this regard, the literature has developed several matching methods, the most used are, according to Becker and Ichino (2002), Stratification Matching (SM), Nearest Neighbor Matching (NNM), Radius Matching (RM) and Kernel Matching (KM).

For the present study, Kernel Matching is the main algorithm. It was chosen because it does not present the problem of matching among families with different propensity scores, given that this is done via the weighted average of the control group, making the two compared groups more homogeneous, and it was the matching method that presented the lowest selection bias.

According to Oh et al. (2009), in Kernel Matching, all benefited individuals are paired with the weighted average of non-benefited individuals, with weights inversely proportional to the distance between the propensity score of benefited and non-benefited individuals.

*b) Database*

The database used to achieve the objective of this work was the PNADC, made available by the Brazilian Institute of Geography and Statistics (IBGE), regarding the second quarter of 2019, the most current period with available data. The sample used is restricted to households that responded to the first interview in 2019 with per capita family income up to half the minimum wage (R$499.00). This amount above the PBF eligibility line (R$178.00) seeks to control the cyclical nature of income, as at some point the poor family may receive more than the limit amount. In any case, cutoff tests based on the PBF eligibility line generally do not change the results.

The research focus on children and adolescents from six to seventeen years old in PBF beneficiary residences, which were also analyzed separately, considering the initial and final years of basic education. The first group is made up of children from six to fourteen years old and a second one by those from fifteen to seventeen years old. This separation is necessary due to the fact that there are unobservable variables depending on the age group, for example, the first group is formed by individuals who necessarily have a higher probability of attending school in relation to the second, since the age group from six to fourteen is characterized by children who are or should be attending elementary school and the age group from fifteen to seventeen are teenagers who are or should be attending high school. Thus, it is possible to verify at which school level the impact of the PBF is greater or has a greater level of significance. It was considered 8,973 total observations.

The choice of the sample is based on variable V5002A, which asks "whether, in the reference period, the household had received income from the Bolsa Família Social Program. In turn, the impact variables that can be observed according to the PNADC are: School Attendance, which considers individuals duly enrolled in school on the day of the survey, with a value of 1 for those enrolled and 0 otherwise; School Dropout, which considers individuals who were not enrolled in school on the day of the survey, with a value of 1 for those not enrolled and 0 otherwise; and School Delay, which considers all individuals who were enrolled in school on the day of the survey, with 1 for those who are behind in school taking into account the grade/age ratio and 0 otherwise and contemplating the purpose of capturing those individuals with two years of delay or more. The decision to consider as lagged those aged two or more was made since in some cases the date of birth of the children would prevent the identification of lagged ones in just one year. In addition, variables associated with the characteristics of the child or adolescent, the reference person in the family and the household were included in the equation of impact of participation in the program, as shown in Table 1, to ensure that the model captured the effect of the program on the variables previously presented.



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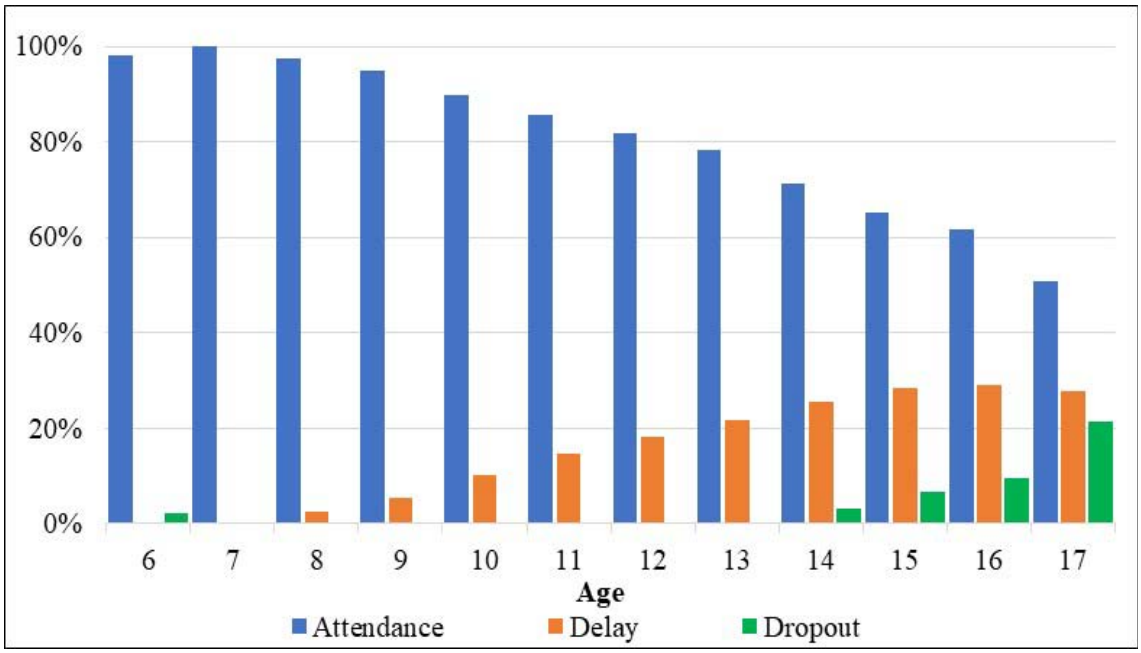
*Table 1:* Control Variables

| Variable | Description |
|---|---|
| **Characteristics of the child or adolescent** | |
| Sex | Binary variable equal to 1 if female. |
| Race/color | Binary variable equal to 1 if Non-White (includes black, brown and indigenous). |
| Age | Age in years. |
| Teaching network | Binary variable equal to 1 if the child attends a private education system. |
| **Characteristics of the reference person** | |
| Sex | Binary variable equal to 1 if female. |
| Race/color | Binary variable equal to 1 if Non-White (includes black, brown and indigenous). |
| Age | Age in years. |
| Married | Binary variable equal to 1 if married |
| Scholarity | Binary variable equal to 1 if incomplete elementary school |
| **Characteristics of the residence** | |
| Number of residents | Number of people in the household |
| Poor | Binary variable equal to 1 if per capita income is less than R$179 |
| Central-West | Binary variable equal to 1 if it resident in the Central-West region of the country |
| Northeast | Binary variable equal to 1 if it resident in the Northeast region of the country |
| North | Binary variable equal to 1 if it resident in the North region of the country |
| South | Binary variable equal to 1 if it resident in the South region of the country |
| Metropolitan | Binary variable equal to 1 if it resident in the metropolitan region |
| Urban | Binary variable equal to 1 if it resident in the urban area |

*Source(s): Own elaboration.*

In Figure 1, the behavior of the impact or outcome variables analyzed in this work can be observed over the years of the Brazilian educational cycle, in which there is a higher school attendance at the beginning of basic education. However, it presents a more significant reduction from the age of fifteen and the age group of seventeen has the lowest school attendance, around 80%. In turn, it appears that Brazil has a lower school delay in the age groups from eight to fourteen years, which corresponds to elementary education, but in the age groups from fifteen to seventeen years it presents a high level of school delay, highlighting the age group of seventeen years old that presents the highest percentage of school delay. Regarding school dropout, it is noticed that it exists from the age of fourteen onwards and increases until it reaches the highest level in the age group of seventeen, in which 21.36% of adolescents have dropped out of school.




*Source(s): Own elaboration from PNADC*

*Figure 1:* Attendance, dropout and school delay by age group in Brazil (%) in 2019



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## IV. Analysis of the Program's Impact on the Educational Level of Children and Adolescents

This section discusses the impact of the PBF on educational indicators, measured through the average treatment effect on the treaties (*ATT*). The results were first estimated for children and adolescents from six to seventeen years old and, later, the age groups from six to fourteen years old and fifteen to seventeen years old were also considered. Additionally, these impacts were estimated segmentally by sex, race/color, regions and by urban/rural area in order to capture different effects of the program on these subgroups of the population.

Estimates of the impacts of the PBF on school attendance, dropout and delay can be seen in Table 2. Analyzing the results for school attendance, it appears that the PBF has a positive impact on it since, as, as noted, the program increases the probability of school attendance among beneficiaries for children and adolescents aged six to seventeen when compared to the control group. The program had a positive impact of 2.48 pp on school attendance considering all ages and an impact of 0.62 pp for children aged six to fourteen. On the other hand, the impact is greater for adolescents aged fifteen to seventeen, around 6.14 pp.

Regarding the results for school delay, it can be seen that the program reduces school delay by around 4.74 pp for the age group from fifteen to seventeen years old, the overall impact is a reduction of 2.09 pp. The PBF has no significant effect on the eight to fourteen age group. Regarding the results for school dropout, it is observed that the PBF reduces school dropout by 2.20 pp for all ages and it reduces 0.62 pp for the age group from six to fourteen years old. The age group from fifteen to seventeen show greater reduction, around 6.14 pp. The results in Table 2 show that the PBF increases school attendance and reduces school delay and dropout, with the expected results for both the frequency and for the delay and for the school dropout.

*Table 2:* Effect of the Bolsa Família Program on attendance, dropout and school delay

| Segmentation | Treatment Group | Group Control | Difference | Standard Deviation | t-value | In Support | |
|---|---|---|---|---|---|---|---|
| | | | | | | Not Treated | Treated |
| **School Attendance** | | | | | | | |
| 6-17 years | 0.9672 | 0.9424 | 0.0248*** | 0.0058 | 4.27 | 3,281 | 5,666 |
| 6-14 years | 0.9956 | 0.9894 | 0.0062** | 0.0030 | 2.06 | 2,333 | 4,285 |
| 15-17 years | 0.8789 | 0.8175 | 0.0614*** | 0.0186 | 3.29 | 948 | 1,379 |
| **School Delay** | | | | | | | |
| 8-17 years | 0.2055 | 0.2264 | –0.0209* | 0.0126 | –1.66 | 2,704 | 4,628 |
| 8-14 years | 0.1485 | 0.1693 | –0.0208 | 0.0130 | –1.59 | 1,874 | 3,400 |
| 15-17 years | 0.3578 | 0.4052 | –0.0474* | 0.0287 | –1.65 | 830 | 1,213 |
| **School Dropout** | | | | | | | |
| 6-17 years | 0.0327 | 0.0547 | –0.0220*** | 0.0058 | –3.77 | 3,281 | 5,683 |
| 6-14 years | 0.0044 | 0.0106 | –0.0062** | 0.0030 | –2.06 | 2,333 | 4,285 |
| 15-17 years | 0.1211 | 0.1825 | –0.0614*** | 0.0186 | –3.29 | 948 | 1,379 |

*Source(s): Own elaboration from PNADC (2019).*
*Note(s): (*) Significant at 10%; (**) Significant at 5%; (***) Significant at 1%.*

Table 3 shows the results on educational indicators while considering the segmentation by sex, race/color, regions of the country and by household situation. In the case of school attendance for boys, there are higher and significant results than those for girls. According to the estimates presented, the PBF supported by its conditionalities increases the school attendance of beneficiary boys from six to seventeen years old by 3.10 pp. For beneficiary girls, the probability of being attending school is 2.13 pp more. As expected, the impact among young people is higher, as a beneficiary boy is more likely to be enrolled, reaching 7.35 pp. Considering the results for race/color, it appears that for all age groups only the results for non-whites were significant. Analyzing the age group from six to fourteen years old, it is observed that the impacts are smaller than for the age group from six to seventeen years old, the impact of receiving benefits increases school attendance by only 0.65 pp in this group. However, in the age group of fifteen to seventeen, the impact is quite expressive, showing a probability of 7.23 pp more.

Regarding the regions of the country, only the Central-West and Southeast regions did not show statistically significant results for ages six to seventeen. Regarding the ones that showed significant results, the greatest impact occurs in the Northern region of the country, in which participating in the program increases school attendance by 3.00 pp, followed by the Northeast region with an impact of 2.81 pp. Considering ages from six to fourteen, none of the regions showed a significant result, but for ages from fifteen to seventeen, only the Northeast region has a statistically significant result, in which the impact is greater than when considering all ages. Regarding the situation of the household, only the estimate for ages six to fourteen for

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the rural area was not significant. In relation to the ones that were significant, the greatest impact occurs for ages fifteen to seventeen living in rural areas, in which a beneficiary of the program residing in rural areas is 7.08 pp more likely to enroll in school.

Examining the same subgroups, the results for school delay for girls show that the program has worked to reduce it, since the chances of delay are lower among those who receive the benefit than for non-beneficiaries. The ages from eight to fourteen years old are the only ones that do not present statistical significance, but in the age group from fifteen to seventeen by the end of basic education, the impact of the program on school delay is a reduction of 13.96 pp. The results for boys show no significance for all age groups, suggesting that the program is not proving effective for them. Regarding race/color, it appears that only for the age group from eight to fourteen years old the results were significant for whites. For the result that showed statistical significance, the impact for whites is that a beneficiary has a lower probability of 4.85 pp of not being enrolled in the correct grade. Again, the estimates highlight that the PBF is not effective in reducing school delay, especially for non-whites, a group that historically presents the highest percentage of students who are lagging behind in school.

Analyzing the results for the regions, it appears that only the Central-West and Northeast regions presented statistically significant results for all age groups. The significant results show that the greatest impacts are found in the Central-West region of the country and especially in the ages of fifteen to seventeen, where the probability of not being enrolled in the correct grade is 14.12 pp less. The results for urban and rural areas showed only significance for the rural area and when considering all ages and the age group between fifteen and seventeen years old. The greatest impact is found for young people living in rural households, which probability of not being enrolled in the correct grade is 10.62 pp less.

Finally, the results for school dropout show that the PBF supported by its conditionalities reduces school evasion of beneficiary boys from six to fourteen years old by 2.75 pp. For beneficiary girls, the probability of dropping out of school is 1.85 pp less. As expected, the impact among young people is more expressive, as a beneficiary boy is less likely to drop out of school, reaching 7.35 pp. While observing the results for race/color, it appears that for all ages only the results for non-whites were significant: the negative impact for non-white beneficiaries is 2.68 pp from dropping out of school. Analyzing children from six to fourteen years old, it is observed that the impacts are smaller than for the age group from six to seventeen years old, the impact of receiving benefits reduces school evasion by only 0.65 pp in this group. However, in the ages referring to the final years of basic education, the impact is quite expressive, with a lower probability of dropping out of school of 7.23 pp.

For regional differences in the country, it appears that only the Northeast and North regions showed statistically significant results, with the greatest impact occurring in the Northern region of the country, where participating in the program reduces school dropout by 2.78 pp. Initial years of basic education, from six to fourteen years old, have no significant results and in the final years, from fifteen to seventeen years old, only the Northeast and North regions have statistically significant results, in which the impact is greater than considering all the ages. Regarding the household situation, all estimates were significant. The greatest impact occurs for adolescents aged fifteen to seventeen living in rural areas, in which a program beneficiary residing in the rural area has a lower probability of dropping out of school than 7.08 pp.

Based on these results, the need for the continuity of the PBF is evident, and it can even be expanded. In this process of continuation and expansion of the program, it would be interesting to add objectives, in partnership with other public policies in order to improve the indicators of school delay and the school performance of children and adolescents benefiting from the program.

*Table 3:* Effect of the Bolsa Família Program on attendance, dropout and school delay for gender, race/color, regions and household situation

| Group | School Attendance | | | School Delay | | | School Dropout | | |
|---|---|---|---|---|---|---|---|---|---|
| | 6-17 years | 6-14 years | 15-17 years | 8-17 years | 8-14 years | 15-17 years | 6-17 years | 6-14 years | 15-17 years |
| **Characteristics of the child or adolescent** | | | | | | | | | |
| Boys | 0.0310*** (3.58) | 0.0030 (0.82) | 0.0735*** (2.73) | 0.0104 (0.55) | –0.0102 (–0.52) | 0.0338 (0.80) | –0.0275*** (–3.14) | –0.0030 (–0.82) | –0.0735*** (–2.73) |
| Girls | 0.0213*** (2.75) | 0.0091* (1.89) | 0.0555** (2.14) | –0.0509*** (–3.12) | –0.0262 (–1.55) | –0.1396*** (–3.63) | –0.0185** (–2.39) | –0.0091* (–1.89) | –0.0555** (–2.14) |
| White | 0.0077 (0.73) | 0.0046 (0.85) | 0.0222 (0.61) | –0.0303 (–1.29) | –0.0485** (–2.00) | –0.0311 (–0.54) | –0.0011 (–0.10) | –0.0046 (–0.85) | –0.0222 (–0.61) |
| Non-White | 0.0295*** (4.24) | 0.0065* (1.80) | 0.0723*** (3.35) | –0.0142 (–0.97) | –0.0116 (–0.76) | –0.0404 (–1.23) | –0.0268*** (–3.85) | –0.0065* (–1.80) | –0.0723*** (–3.35) |



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| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Characteristics of the residence** | | | | | | | | | |
| Central-West | –0.0052<br>(–0.42) | 0.0020<br>(0.34) | –0.0370<br>(–0.64) | –0.0775*<br>(–1.83) | –0.0986**<br>(–2.17) | –0.1412**<br>(–2.05) | 0.0078<br>(0.62) | –0.0020<br>(–0.34) | 0.0370<br>(0.64) |
| Northeast | 0.0281***<br>(2.83) | 0.0034<br>(0.72) | 0.0884***<br>(2.93) | –0.0505**<br>(–2.56) | –0.0409**<br>(–2.06) | –0.0875*<br>(–1.95) | –0.0241**<br>(–2.42) | –0.0034<br>(–0.72) | –0.0884***<br>(–2.93) |
| North | 0.0300**<br>(2.25) | 0.0103<br>(1.05) | 0.0915**<br>(2.22) | 0.0112<br>(0.41) | 0.0046<br>(0.16) | 0.0262<br>(0.41) | –0.0278**<br>(–2.07) | –0.0103<br>(–1.05) | –0.0915**<br>(–2.22) |
| Southeast | –0.0006<br>(–0.06) | –0.00003<br>(-0.01) | –0.0339<br>(–0.88) | –0.0190<br>(–0.79) | –0.0299<br>(–1.19) | 0.0468<br>(0.85) | 0.0091<br>(0.81) | 0.0000<br>(0.00) | 0.0339<br>(0.88) |
| South | 0.0217*<br>(1.69) | 0.0038<br>(0.77) | 0.0144<br>(0.20) | –0.0128<br>(–0.33) | 0.0157<br>(0.43) | –0.0715<br>(–0.60) | –0.0193<br>(–1.48) | –0.0038<br>(–0.77) | –0.0144<br>(–0.20) |
| Urban | 0.0219***<br>(3.36) | 0.0088**<br>(2.57) | 0.0525**<br>(2.41) | –0.0081<br>(–0.54) | –0.0213<br>(–1.37) | 0.0139<br>(0.40) | –0.0182***<br>(–2.79) | –0.0088**<br>(–2.57) | –0.0525**<br>(–2.41) |
| Rural | 0.0264**<br>(2.57) | 0.0055<br>(1.14) | 0.0708**<br>(2.13) | –0.0436**<br>(–2.11) | –0.0309<br>(–1.41) | –0.1062**<br>(–2.17) | –0.0241**<br>(–2.34) | –0.0055<br>(–1.14) | –0.0708**<br>(–2.13) |

*Source(s): Own elaboration from PNADC (2019).*
*Note(s): (*) Significant at 10%; (**) Significant at 5%; (***) Significant at 1%. t-value in parentheses.*

## V. Discussion of Results

The results of the study suggest that participation in the PBF increases school attendance and reduces school dropout, especially for non-white boys, aged between fifteen and seventeen, living in rural areas and in the Northeast and North regions. In addition, participation in the PBF also reduces school delays, but it happens especially for girls, whites, adolescents aged between fifteen and seventeen and residents of rural areas and in the Central-West and Southeast regions of the country.

These results are similar to those obtained in studies of cash transfer programs in Mexico, Chile, Uruguay and Argentina. In Mexico and Chile, Oportunidades and Chile Solidario have increased school enrollment (Schultz, 2000a; Behrman at al., 2001; Behrman et al., 2009; Parker, 2011; Galasso, 2006). In Uruguay, the work by Machado et al. (2012) also observed an increase in school enrollment, but mainly in adolescents between sixteen and seventeen years old, which is also observed in this work for the Brazilian program. Regarding the results of school dropout, they are consistent with those found in the study by Salvia et al. (2015) and Jiménez and Jiménez (2016) for the Argentinean program, in which they point out that school dropout rates for program participants have reduced, being the greatest reduction for men and for the sixteen to seventeen age groups, this impact is similar to the one from PBF on its beneficiaries.

The general results for school attendance are in agreement with most studies found in the Brazilian literature, regardless of the database and methodology adopted. However, these results are in the opposite direction to those found by Ribeiro and Cacciamali (2012), since, for the authors, there is no distinction between the rates of school attendance and school delay of beneficiaries and non-beneficiaries of the program. The difference between genders is significant, once the program has more expressive and positive effects among boys for school attendance, a result different from that presented in Melo and Duarte (2010) and Kern et al. (2017) since in their results, those for boys were not statistically significant.

Evidence for dropping out of school suggests that the program has achieved its main objective, which is to reduce school dropout rates among benefited children and adolescents and, consequently, increase school attendance. These results for school dropout, when confirming those obtained for attendance, indicate the robustness of the analysis. In turn, the results for school delay do not follow the literature, probably due to the use of a different methodology and database for a more recent period. The analysis period for school delay is a very important factor, as the improvement in school performance happens in the long term, unlikely the impacts on school attendance. For example, the most recent study, Neto et al. (2020), used data from the 2010 Demographic Census, carrying out the study only for the Northeast region of the country, in which it did not find significant effects on school lag.

The results show that progressing in school has a more significant effect on young beneficiaries aged fifteen to seventeen. The cost of staying in school seems higher for young people in this age group, especially those living in rural areas, who often lose interest in school or do not give up working. It shows that the creation of the Youth Variable Benefit meant that these young people, who had often already left school or needed to work to supplement the family income, dedicated more time to school, thus increasing their progress and keeping them in school.

In this sense, it is important to emphasize that the PBF is an income transfer program that is still showing significant effects on educational indicators, that is, attendance, dropout and school delay as this study analyzed data from 2019 and showed that an increase is occurring in school attendance and a reduction in dropouts and school delays, and that the PBF is still working to break the generational cycle of poverty, bearing in mind that the results of the objectives



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of the income transfer programs will be achieved in the long term.

## VI. Conclusions

This study aimed to investigate the impact of the PBF on educational indicators for children and adolescents aged six to seventeen in Brazil, considering that the program has a conditionality directly related to education. Additionally, seeking to identify and highlight heterogeneities and specificities, these estimates were also obtained for the initial and final years of basic education, the country's macro-regions, race/color and gender.

The effect of the program, initially estimated for children aged between six and seventeen, confirmed that there is a significant impact on educational indicators, showing an increase in school attendance and a reduction in dropout and school delays among its beneficiaries. However, this effect is greater at the end of basic education, for adolescents. Furthermore, the results also showed differences in the effects of the Bolsa Família Program when considering some subgroups. The impact on school attendance and dropout is more relevant for boys, non-whites and residents of the North and Northeast regions and rural areas. In the case of school delay, its reduction is more significant for girls, whites and residents of the Central-West and Northeast regions and rural areas of the country.

Thus, the results of this study allow us to state that the PBF, through educational conditionality, has a positive impact on school attendance, indicating that beneficiaries are more likely to attend school, although important heterogeneities are also observed when considering macro-regions, gender, race/color or area of residence. In turn, in the case of school delay and school evasion, the effect is negative, indicating a smaller delay and school evasion than the group of non-beneficiaries. Thus, it is necessary to expand public policies for this portion of the population, since the current ones are causing an increase in attendance and consequently reducing school dropouts and school delays, thus making it possible to interrupt the intergenerational cycle of poverty.

## References Références Referencias


1. Barbosa, A. L. N.D. H., & Corseuil, C. H. L. (2014). *Bolsa Família, Escolha Ocupacional e Informalidade no Brasil*. Brasília, IPEA.
2. Becker, G. S. (1964). *Human Capital a Theoretical and Empirical Analysis, With Special Reference to Education*. New York, Columbia University Press.
3. Becker, S. O., & Ichino, A. (2002). Estimation of Average Treatment Effects Based on Propensity Scores. *The Stata Journal*, 2(4), 358-377. https://doi.org/10.1177/1536867X0200200403.
4. Behrman, J.R., Gallardo, J., Parker, S.W., Todd, P.E., & Vélez, V. (2009). *How Conditional Cash Transfers Impact Children and Adolescent Youth in Urban Mexico*. University of Pennsylvania.
5. Behrman, J.R., Sengupta, P., & Todd, P. (2001). Progressing through PROGRESA: An Impact Assessment of a School Subsidy Experiment. April, *International Food Policy Research Institute*, Washington, D.C.
6. Bourguignon, F., & Chakravarty, S. R. (2003). The Measurement of Multidimensional Poverty. *Journal of Economic Inequality*, 1(1), 25-49. https://doi.org/10.1023/A:1023913831342.
7. Cacciamali, M. C., Tatei, F., & Batista, N. F. (2010). Impactos do Programa Bolsa Família Federal sobre o Trabalho Infantil e a Frequência Escolar. *Revista de Economia Contemporânea*, 14(2), 269-301. https://doi.org/10.1590/S1415-98482010000200003.
8. Cavalcanti, D., Costa, E., & Silva, J. (2013). Programa Bolsa Família e o Nordeste: Impactos na Renda e na Educação, nos anos de 2004 e 2006. *Revista de Economia Contemporânea*, 17(1), 99-128. https://doi.org/10.1590/S1415-98482013000100004.
9. Chitolina, L., Foguel, M. N., & Menezes-Filho, N. (2013a). *O Impacto da Expansão do Programa Bolsa Família sobre a Frequência Escolar*.
10. De Brauw, A., Gilligan, D.O., Hoddinott, J., & Roy, S. (2015). Bolsa Familia and Household Labor Supply. *Chicago Journals*, 63, 423-457.
11. Galasso, E. (2006). *With Their Effort and One Opportunity: Alleviating Extreme Poverty in Chile*. Washington, D.C.
12. Gertler, P. J. (2000). Final Report: The Impact of PROGRESA on Health, November, Report submitted to PROGRESA. *International Food Policy Research Institute*, Washington, D.C.
13. Heckman, J., & Masterov, D. (2007). The Productivity Argument for Investing in Young Children. *Applied Economic Perspectives and Policy*, Oxford University Press, 29(3), 446-493. https://doi.org/10.1111/j.1467-9353.2007.00359.x.
14. Hoddinott, J., Skoufias, E., & Washburn, R. (2000). The Impact of PROGRESA on Consumption: A Final Report. September, *International Food Policy Research Institute*, Washington, D.C.
15. Jannuzzi, P. M., Bichir, R. M., & Ritzi, R. (2012). *Bolsa Família e Seus Impactos nas Condições de Vida da População Brasileira: Principais Resultados da Pesquisa de Avaliação de Impacto do Bolsa Família II*. Brasília, MDS/Sagi.
16. Jiménez, M., & Jiménez, M. (2016). Efectos del programa Asignación Universal por Hijo en la deserción escolar adolescente. *Cuadernos de Economía*, 35(69), 709-752.
17. Kern, A.P., Vieira, M.D. T., & Freguglia, R. S. (2017). Impactos do Programa Bolsa Família na Educação




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das Crianças. In: *45º Encontro Nacional de Economia*, Natal.
18. Kuznets, S. (1955). Economic Growth and Income Inequality. *American Economic Review*, 45(1), 1-28.
19. Larrañaga, O., Conterras, D., & Tagle, J. R. (2009). *Evaluación Del Impacto de Chile Solidario para La Primera Cohorte de Participantes*. Borrador PNUD.
20. Machado, A., Moreno, M., Terra, F., & Hernández, M. (2012). *El Nuevo Régimen de Asignaciones Familiares: Su Impacto en La Participación y Permanencia en El Ciclo Básico de Educación Media*. Mimeo, MIDES.
21. Marinho, E., & Mendes, S. (2013). The Impact of Government Income Transfers on the Brazilian Job Market. *Estudos Econômicos,* 43(1), 29-50.
22. Martínez, J. C., & Trajtenberg, L. (2016). *Evaluación del Impacto de La Asignación Universal Por Hijo Para Protección Social Sobre la Formalidad Laboral: Profundización del Caso Argentino*. Anales Li Reunión Anual de La Asociación Argentina de Política Económica.
23. Melo, R.M.S., & Duarte G.B. (2010). Impacto do Programa Bolsa Família Sobre a Frequência Escolar: O Caso da Agricultura Familiar no Nordeste do Brasil. *Revista de Economia e Sociologia Rural*, 48(3), 635-657. https://doi.org/10.1590/S0103-20032010000300007.
24. Mincer, J. (1958). Investment in human capital and personal income distribution. *Journal of Political Economy*, 66(4), 281-302.
25. Ministry of Social Development (2019). *Social Monitoring Panel:* Bolsa Família Program: Benefits. Brasília, Retrieved April 25, 2020, from https://aplicacoes.mds.gov.br/sagi/vis/dash/painel.php?d=137.
26. Myrdal, G. (1968). *Teoria Econômica e Regiões Subdesenvolvidas*, Editora Saga, Rio de Janeiro.
27. Neto, A. G., Santos, A. M. A. dos., & Prates, T. M. (2020). How Bolsa Família Program Impacts on Basic Education? An Analysis for the Brazilian Northeast. *Revista Econômica do Nordeste*, Fortaleza, 51(1), 51-72.
28. Nurkse, R. (1969). Alguns Aspectos Internacionais do Desenvolvimento Econômico. In: Agarwala, A. N. e Singh, S. P. (Ed.), *A Economia do Subdesenvolvimento*, Editora Forense, Rio de Janeiro.
29. Oh, I., Lee, J.D., Heshmati, A., & Choi, G.G. (2009). Evaluation of Credit Guarantee Policy Using Propensity Score Matching. *Small Business Economics*, 33(3), 335-351. https://doi.org/10. 1007/s11187-008-9102-5.
30. Oliveira, L.F.B., & Soares, S.S.D. (2013). *O Impacto do Programa Bolsa Família Sobre a Repetência: Resultados a Partir do Cadastro Único, Projeto Frequência e Censo Escolar*. Instituto de Pesquisa Econômica Aplicada, Brasília.
31. Paiva, L. H., Falcão, T., & Bertholo, L. (2013). Do Bolsa Família ao Brasil sem Miséria: Um Resumo do Percurso Brasileiro Recente na Busca da Superação da Pobreza Extrema. In: NERI, M. C., & CAMPELLO, T. (Org.), *Programa Bolsa Família: Uma década de Inclusão e Cidadania*, Brasília, Ipea, pp. 25-46.
32. Parker, S. W. (2011). Resultados de Oportunidades en Educación en Zonas Urbanas, en *Evaluación Externa del Programa Oportunidades 2010 en Zonas Urbanas (2002 - 2009)*. México, Secretaría de Desarrollo Social (SEDESOL).
33. Parker, S., & Skoufias, E. (2000). The Impact of PROGRESA on Work, Leisure, and Time Allocation, October, Report submitted to PROGRESA. *International Food Policy Research Institute*, Washington, D.C.
34. Pedrozo, E. (2007). Uma avaliação ex-ante dos impactos do Bolsa Família na redução do trabalho infantil, *Anais do XXXII Encontro Nacional de Economia*.
35. Pellegrina H. (2011). *Impacto de Curto Prazo do Programa Bolsa Família Sobre o Abandono e o Desempenho Escolar do Alunado Paulista*. Dissertação de Mestrado, Instituto de Pesquisas Econômicas, Faculdade de Economia e Administração, Universidade de São Paulo, São Paulo.
36. Perry, G., Arias, O., Lopez, H., Maloney, W., & Servén, L. (2006). Poverty Reduction and Growth: Virtuous and Vicious Circles. *The World Bank*.
37. *Pesquisa Nacional por Amostra de Domicílios Contínua (PNADC)* (2019). Instituto Brasileiro de Geografia e Estatística (IBGE). Retrieved June 16, 2020, from https://www.ibge.gov.br/estatisticas/sociais/trabalho/9173-pesquisa-nacional-por-amostra-de-domicilios-continua-trimestral.html?Edicao=20653&t=downloads.
38. Ribeiro R., & Cacciamali, M. (2012). Impactos do Programa Bolsa Família Sobre os Indicadores Educacionais. *Revista Economia*; 13(2), 415-446.
39. Rosenbaum, P. R., & Rubin, D. B. (1983). The Central Role of the Propensity Score in Observational Studies for Causal Effects. *Biometrika*, 70(1), 41-55.
40. Salvia, A., Tuñón, I., & Poy, S. (2015). Asignación Universal por Hijo para la Protección Social: Impacto Sobre el Bienestar Económico y el Desarrollo Humano de La Infancia. *Revista de Estudios Sociales*, 22(2).
41. Schultz, T. P. (2000a). School Subsidies for the Poor: Evaluating a Mexican Strategy for Reducing Poverty, June. *International Food Policy Research Institute*, Washington, D.C.
42. Silveira, F. G., Van Horn, R, & Campolina, B. (2014). *Impactos do Bolsa Família na Alocação do Tempo entre Escola e Trabalho de Crianças e Adolescentes*



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*de 10 a 18 Anos*. Seminários, Centro de Desenvolvimento e Planejamento Regional da Universidade Federal de Minas Gerais.
43. Skoufias, E., & McClafferty, B. (2001). *Is Progresa Working? Summary of the Results of an Evaluation by IFPRI*. International Food Policy Research Institute (IFPRI).
44. Soares, F. V., Ribas, R. P., & Osório, R G. (2010). Evaluating the Impact of Brazil's Bolsa Familia: Cash Transfer Programs in Comparative Perspective. *Latin American Research Review*, 45(2), 173-190.
45. United Nations Development Program (UNDP). (2019). *Human Development Report*. Retrieved March 30, 2020, from www.pnud.org.br/rdh.
46. World Bank. (2018). *Indicator, Poverty Incidence Rate*. Retrieved March 25, 2020, from https://datos.bancomundial.org/indicador/SI.POV.DDAY?view=chart.



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# Resolution of the M-Shape Pattern of the Outdoor Air Temperature Environmental Kuznets Curve (EKC) for Metropolitan Areas in a Country: Using Long-Term Monthly Level Data of Taipei City as Empirical Evidence

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*Abstract-* In Taiwan, the heat island effect is the most significant in Taipei City. Thus this research provides a causal explanation for why urban outdoor air temperature has an M-shape EKC pattern for metropolitan areas in a country. Results show that the growth rate change in CO2 concentration can induce changes to the periods of the La Nino effect and El Nino effect, causing high fluctuations in rain accumulation. The amount of rain then alters A-type evaporation, and so the evaporation amount is the top factor for the diffusion of a city's heat. This fluctuation plays as a cooling and heating source for the V region of the M shape in the outdoor air temperature EKC pattern. In our previous studies, the growth rate change in CO2 concentration correlates to the energy structure. Therefore, a heat sinking model has been proposed to explain the accumulation of heat in a city, in which a proportion process for the solar irradiation source from buildings and remodeling engineering from a public housing policy and the private sector can play as a heating source of the two peaks of the M shape and present long-term linear growth in the outdoor air temperature EKC pattern.

*Keywords:* *environmental kuznets curve, v-shape, remodeling.*

*GJHSS-E Classification:* *FOR Code: 149999*




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*Keywords: environmental kuznets curve, v-shape, remodeling.*

## I. Introduction

The definition of "outdoor air temperature" is the temperature between the urban canopies from the ground surface. This is the significantly environment contributed by human activities. The definition of "surface temperature" is the heat emitted from the soil, ground surface, and buildings. Previous works have found that the factors contributing to the formation of an urban heat island effect are caused by urbanization and climate change effects (Aekbal Salleh et al., 2013; Miao and Chen, 2014; Yang et al., 219; Yunfei et al., 2020).

Taiwan's urbanization is over 79%, while the average for the world is 52%. The literature has proposed the urban heat island effect to describe the problem of using fossil energy along with thermal-isolated building materials in tall buildings that would cause an increase in urban outdoor air temperatures. In recent 20 years, global warming and increasing $CO_2$ concentration have become challenges in the world. The correlations among the greenhouse effect, global warming effect, heatwave and the urban heat island effect have spurred official arguments that reducing of carbon emissions is necessary for slowing down global warming. In the future, the carbon tax for the imported good is being adopted by the EU in 2026 to force major manufacturing countries to use renewable energy, including natural gas.

The Environmental Kuznets curve (EKC) was proposed for the environment from income-driven actions (Kuznets, 1955; Grossman and Krueger, 1991; Stern, 2004; Egli and Steger, 2007; Yu and Chen, 2012; Kong and Khan, 2019). From data spanning 1985 to 2015 in Taiwan, the primary-energy consumption-to-GDP ratio (called energy intensity) exhibits an EKC pattern (an inverted U-shape of primary-energy consumption along with increasing GDP). Our previous study found the turning point of primary energy EKC to be driven by an exogenous event to endogenous policy (Huang, 2020). The formation mechanism of $CO_2$ emission amount is a perfectly inverted V-shape due to the disproportion process of electric energy (Huang, 2021). Most studies in the literature have compared cross-country data and formulated a mathematic equation for a long period. In our previous paper, we have developed an event-induced mechanism (Huang, 2020) to explain the formation of an EKC pattern at the single country level within the Kuznets' 15-25 years. In our previous paper we have developed a new methodology to explain why $CO_2$ concentration still maintains growth even when Taiwan has significantly reduced the emission amount of $CO_2$ due to natural gas becoming a growing source of energy (Huang, 2021). This paper aims to find the key factors attributed to the increase in outdoor air temperature.

## II. Methods

The panel data used in this paper were collected from the open-source of Taipei City's official website (https://www.gov.taipei/) and Taiwan's Central Weather Bureau (https://www.cwb.gov.tw/). Most of the raw data are in Chinese.

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## III. Results

Based on our previous publications, the EKC pattern can be a linear growth type. Figure 1 shows the growth pattern of atmospheric temperature for Taipei City from 1996 to 2021. For one-tail hypothesis testing, we use the 5% significance level, and thus Z*> 1.69. Here, H0 is observed to be 25 between 1996 to 2021, with a standard derivation of "s" years. The Kuznets infrastructural investment cycle is estimated at 15 to 25 years, and in this paper, we choose 23 years (x), and the observed average value is 25 years (H0). If H0 is not being rejected, then the Z value must be higher than Z*. The calculated value of s* is < 4.1 years. From Figure 1, the observed value of s is 2.0 years, which meets the calculated value. Therefore, the outdoor air temperature data span 1998-2021, and the duration meets the EKC time scale. However, the EKC pattern usually is in an inverted U-shape or inverted V-shape, and in Fig. 2, we observe a V-shape. Therefore, we recognize that this period of outdoor air temperature adheres to the Kuznets curve and is not the environmental Kuznets curve, which means that the air temperature is not an environmental concern for people. There is no need to change their behavior for reducing the air temperature. The whole period in Fig. 1 is composed of several curves covering shorter periods.

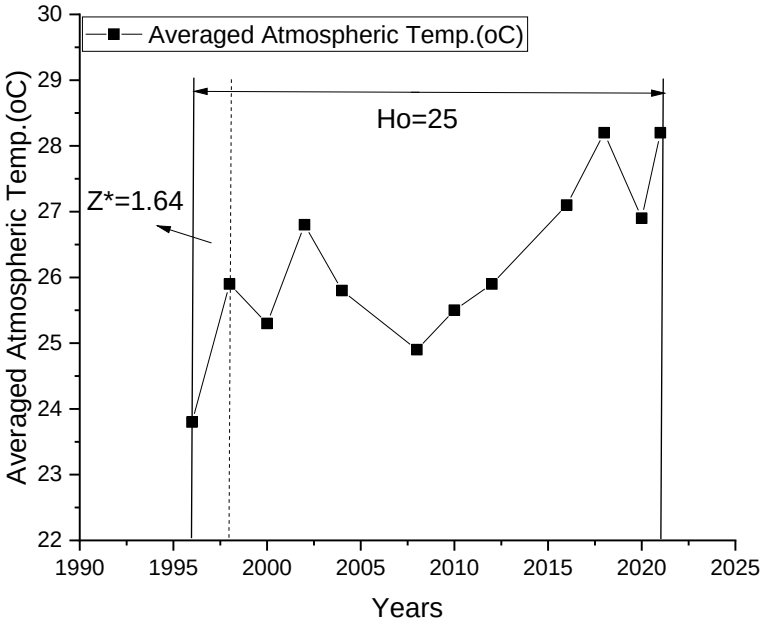


*Figure 1:* Outdoor Air Temperature of Taipei City for 1996-2021.

Figure 2 compares the city's population and outdoor air temperature of Taipei. We observe the onset of growth in the city's atmospheric temperature starts since 2008, while the onset point in the city's population has begun since 2010. The most significant difference is observed between 2016 to 2021. Therefore, we note that the population is not the major contributor to the atmospheric temperature or the urban heat island effect at a single-city level in Taiwan. The increase in $CO_2$ emissions and the outdoor air temperature has pushed the theory that $CO_2$ is the major contributor to global warming, and global warming heats the urban atmospheric temperature. If global warming is a wholly environmental issue, then it should behave like a universal phenomenon for all of Taiwan. Still, after we compared the history data of air temperature for the country's biggest six cities, only Taipei City has the highest temperature increment in the past 25 years. If our observation is correct, then the key contribution of the urban heat island effect might not be from $CO_2$ directly, so a clear cut-off relation between hot wave and heat island effect should be clarified.

Taipei is a metropolitan area as well as the capital. In recent years, the population has started moved to neighborhood cities (Fig. 1). In addition, the highest urban heat island effect has occurred in Taipei for ten years, since 2010. Taipei City also has a very high density of tall buildings, and the age of those buildings is 35 years old, which is the highest among the six major cities in Taiwan. Therefore, this city provides a perfect condition to ignore the contribution of humans' life activities on heat emissions and consider physical factors that contribute to the heat island effect. Taiwan is an island country and has a small area. Therefore, $CO_2$ concentration can be treated as homogenous for all of Taiwan, and so the global warming effect is not the major issue for the urban heat island effect in Taipei City. The urban heat island effect is indeed occurred in Taipei City, but the hottest sites caused by heatwave in Taiwan are not in Taipei City.

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Therefore, the heatwave is not the dominated contributor to the urban heat island effect of Taipei City. This study aims to find the dominant factors contributing to the urban heat island effect in Taipei City.

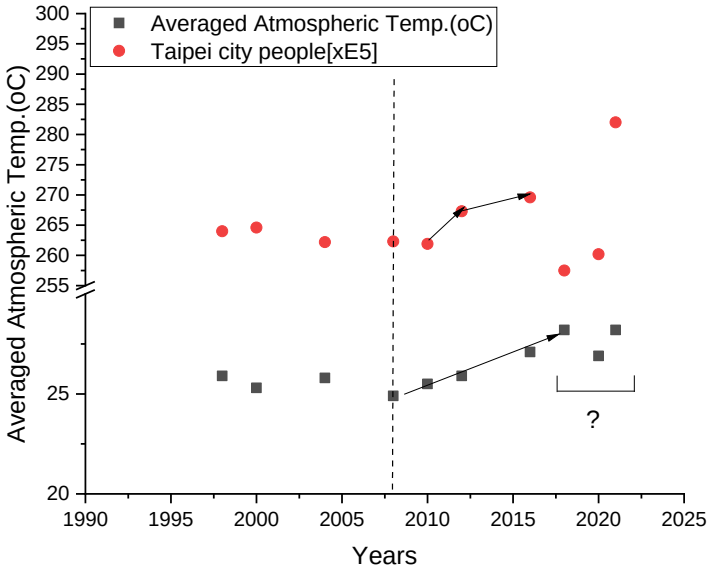


*Figure 2:* Population and Atmospheric Temperature of Taipei City for 1998-2021.

To identify the major contributors to atmospheric temperature, we employ our previously developed methodology. Linear growth with a stepwise fluctuation on the atmospheric temperature EKC in Taipei shows at least two contributors from various sources. We define this kind of growth model as the "proportional process" shown in Scheme 1. The two major contributors to atmospheric temperature in Taipei City are classified as "human heat source" and "constrained emission potential heat from buildings/ road sinks." These two heat sources contribute to atmospheric temperature individually, and that is why we observe that atmospheric temperature has a linear growth with a stepwise fluctuation. The fluctuation usually is contributed from the potential heat released from buildings/road sinks or human heat sources.

We consider another heating model shown in Scheme 2 that we define as a "disproportional process." In such heating model, solar irradiation heats the atmospheric temperature at first, followed by a heating of buildings/roads by the hot outdoor air temperature. The potential heat of buildings/road sinks combines with the human heat source to heat the outdoor air temperature again. In such a process, we expect that the outdoor air temperature shows an inverted V-shape, at once stopping the growth of the population. However, the population in Taipei City shows constant increment from 1998 to 2008 and even a slight decrease between 2016-2020 (Fig. 1). However, we observe that the atmospheric temperature keeps increasing for 2016-2018. Therefore, we make sure the model will follow Scheme 1 rather than Scheme 2.

Another reason to check Scheme 1 might be a suitable model is based on the fact that 35% of solar irradiation is reflected outer space by clouds; 18% of solar irradiation is absorbed by the atmospheric environment; 47% of solar irradiation is absorbed by the earth's surface. In a rural region, the surface is surface water, soil, and plants, while in a city region, the surface is roads and exterior walls of buildings. When surface absorbs solar irradiation, the potential heat will be kept inside the pavement level and concrete structure, respectively, due to high thermal conductivity. In other words, when there are more buildings, the absorbed potential heat increases, if the building does not transport the heat to the underground level (soil), then a higher atmospheric temperature can be expected. Such heat inside the concrete structure of a building will be transported to the soil. That is why the atmospheric temperature can maintain equilibrium, and even the heat island effect occurs, the strength is at the range of 3-4°C in Taiwan.



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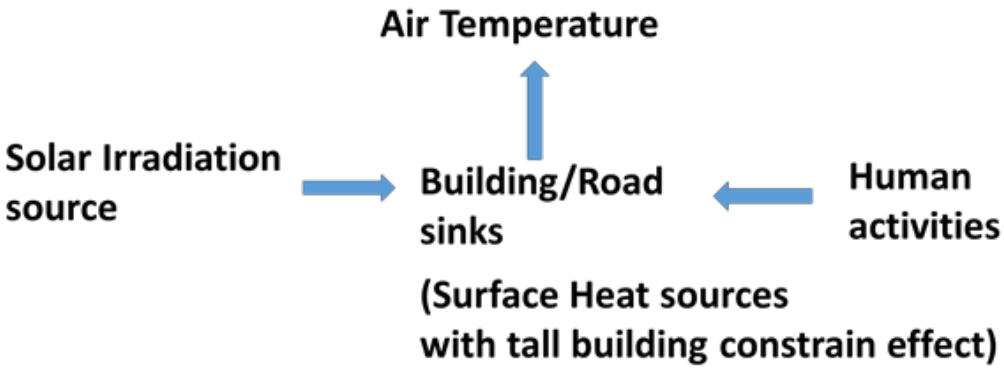
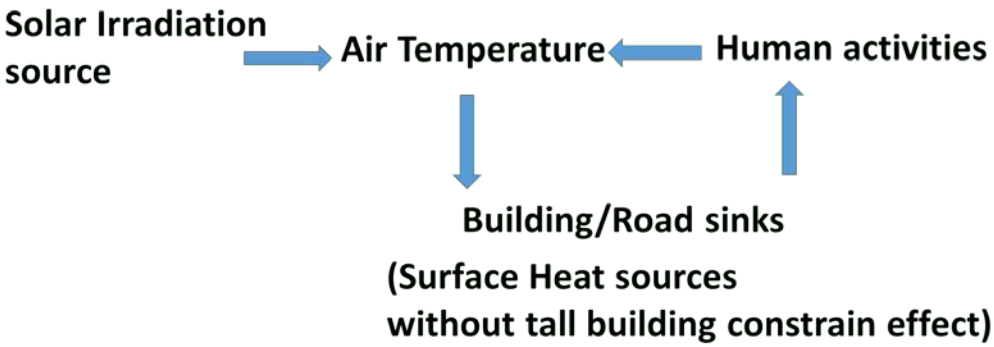



*Scheme 1:* The proposed proportion process of direct solar irradiation and constrained emissions from buildings/road sinks on the heating of air temperature in Taipei City.




*Scheme 2:* The proposed disproportion process of direct solar irradiation and non-constrained emissions from human activities on the heating of air temperature in Taipei City.

Figure 3 illustrates the curves of the average air temperature with the amount of A-type evaporation in Taipei. We observe that an aging building induces a change in the thermal conductivity of the concrete structure. The amount of A-type evaporation exhibits a V-shape pattern, and according to the literature on the cycle of thermal conductivity of concrete structure being 20 years, the historical data of Taipei City also meet this claim. When the number of new buildings decreases, the atmospheric temperature increases the thermal conductivity of a new building starts a decreasing stage from 1 to 10 years and following an increment stage at the 11-20 years. A building built in 1998 had the lowest thermal conductivity in 2008, and it recovered to its original thermal conductivity in 2018. This fact has an evidence in Taipei city.

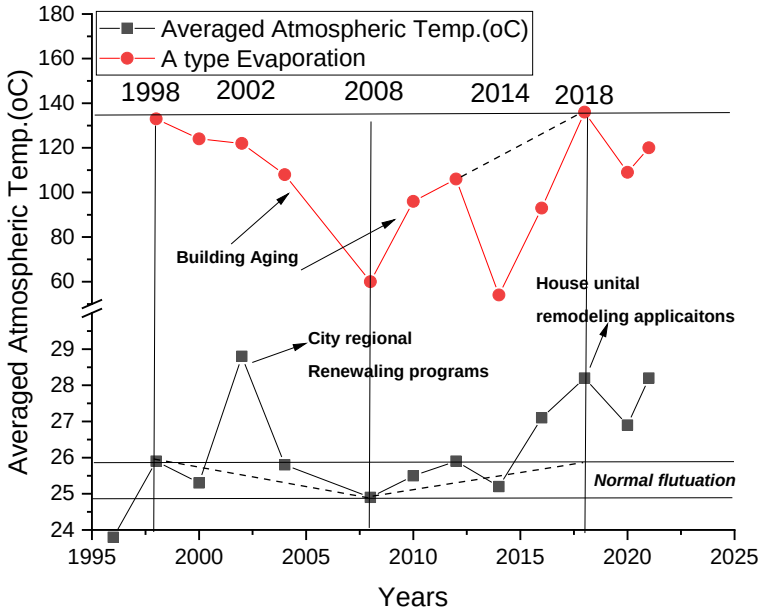



*Figure 3:* Average Atmospheric Temperature with Amount of A-type Evaporation in Taipei City for 1998-2021.



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The heat transportation from buildings to soil is therefore confirmed, and the air temperature also has a V-shape background curve from 1998 to 2018 in Fig. 3. There are two peaks of temperatures observed between 2000-2004 and 2014-2020. Those two peaks can be attributed to the human heat source of building remodeling. Figure 4 presents the licenses of total floor area usage issued for new buildings. From 1998 to 2008, the license-issued of total floor area usage for new buildings was constant every year, but decrease between 2008-2017. There was a fast growth in the number of old house remodeling in 2016 (Fig. 5), bringing a sharp uptick in atmospheric temperature in Taipei City for 2002 and 2016. Newly modeled buildings are almost covered with thermal-isolation bricks on the exterior wall, causing solar irradiation to potentially accumulate in the atmosphere as potential heat for evaporated water. We call this surface heat source instead of human heat source through a proportional process shown in Scheme 1.

From the data of Fig. 4 and Fig. 5, we observe that remodeling by the public sector was high in 2002, while private sector remodeling was high in 2018. Comparing the data of A-type evaporation, the remodeling in 2002 did not affect evaporation, meaning that the style of remodeling was to renew the exterior wall of buildings. The remodeling style in 2018 was to re-build the whole building and use underground water. Whatever engineering technique is used, a remodeled building must have a relatively higher strength of surface heat during the stage of remodeling. From the results of Fig. 5, we see that limiting 50 cases per year for remodeling is the threshold to keep the atmospheric temperature at 26°C with a normal fluctuation range of 1°C.

Figure 6 compares the remodeling number of buildings and air temperature in Taipei City from 1998 to 2021. The infrastructure in Taipei focused on roads from 1950 to 1970. Taipei City government's national housing started in 1970. From 1999 to 2003, building remodeling focused on so-called military villages. In 2016, the central government announced to build 200,000 units of social rented housing. The highest number of these units are in Taipei City at around 12,600. Therefore, we can make sure that the two peak growth periods in remodeling in 2000-2003 and 2017-2019 are the remodeling of old buildings for social housing in Taipei City and remodeling of military villages for new buildings, respectively. In conclusion, the remodeling number driven by the private sector is the real driving force and has a stepwise growth EKC pattern.

Even if the only maximum annual air temperature is for the EKC pattern, the whole average air temperature also possesses an EKC property. Still, the pattern is modified by the amount of A-type evaporation and the remodeling number driven by the public sector and being M-type. The M-type is also an EKC pattern. If the EKC is a long-term trend to identify environmental concerns, then the air temperature might not be a strongly recognized relative issue. People understand the heat-island effect is caused by civil development, but people still intend to live in a city for a better job and education. To address the living space issue for a crowded city, remodeling the old buildings is the best choice. In Taipei City, the local government has carried out city renewal engineering nearly every 20 years, as mentioned in the previous paragraph.

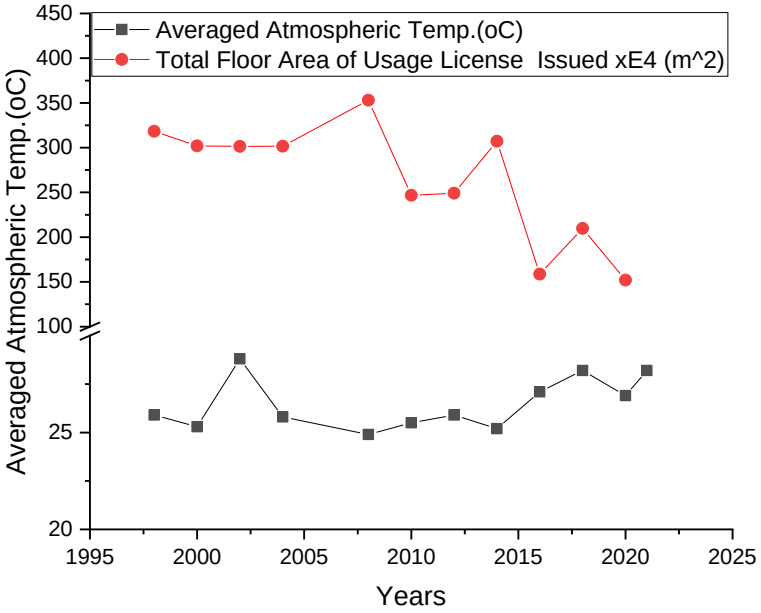


*Figure 4:* Average Atmospheric Temperature with Licenses for Total Floor Area of Usage Issued for New Buildings in Taipei City for 1998-2021.



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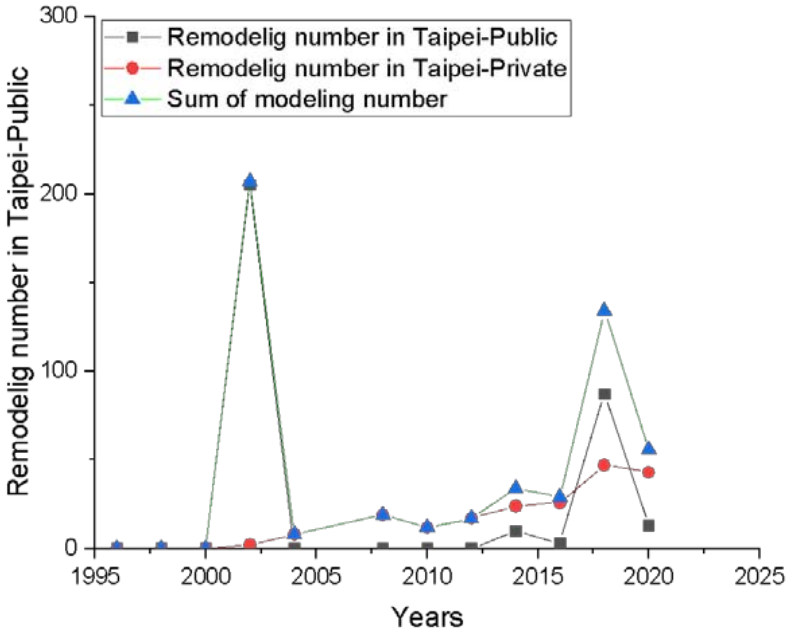


*Figure 5:* The Number of Remodeled Building in Taipei City for 1998-2021.

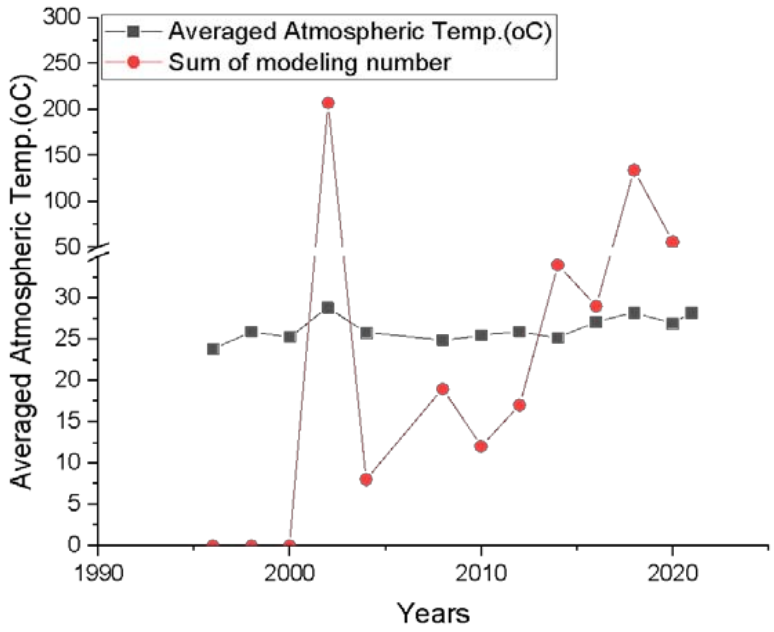


*Figure 6:* Average Atmospheric Temperature and Number of Remodeled Buildings in Taipei City for 1998-2021.

In Fig. 3, we expected to observe two shorter periods embedded in the EKC baseline to make the M-shape. We now can confirm that those two peaks are both due to the local government policy in Fig. 7. From the results of Fig. 7, the people population number is not a key factor on affecting the maximum annual air temperature. From the results of Fig. 8, the major contributor to the maximum annual air temperature is the number of private remodeled buildings in Taipei City. The slope of $CO_2$ concentration increment (A1) is different from that of maximum annual air temperature (A2) (Fig. 9), due to the remodeled buildings can be heat sinks for solar irradiation. Although $CO_2$ is a heat transducer, it is not a sink naturally. From our results, the growth in the baseline of maximum air temperature comes from the amount of remodeling by the private sector. In contrast, the peak increment comes from the amount of remodeling by the public sector. The



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minimum air temperature has a long-term decrease and growth period. Therefore, we can ignore the contribution of the minimum air temperature, which is contributed by the amount of A-type evaporation.

The two peaks from policy demand or remodeling of buildings by the private sector both do not have a long-term effect, but rather a short-term one, due to the building sink can maintain the heat during the day (when the sun is out). Still, at night-time the sank heat must leave the building. If the sinking-leaving upcycle is on a 24-hour time scale, we do not observe the urban heat island effect. Therefore, such upcycle must be on a yearly time scale - that is, for the evaporation of water, the sank heat can leave the buildings only by rain. This is the reason we can observe the normal fluctuation in the average air temperature. However, the amount of A-type evaporation amount is also affected by city development, as more heat sink means less rainwater can be stored as underground water. In the hot season, the heat of a city during the day will not leave quickly.

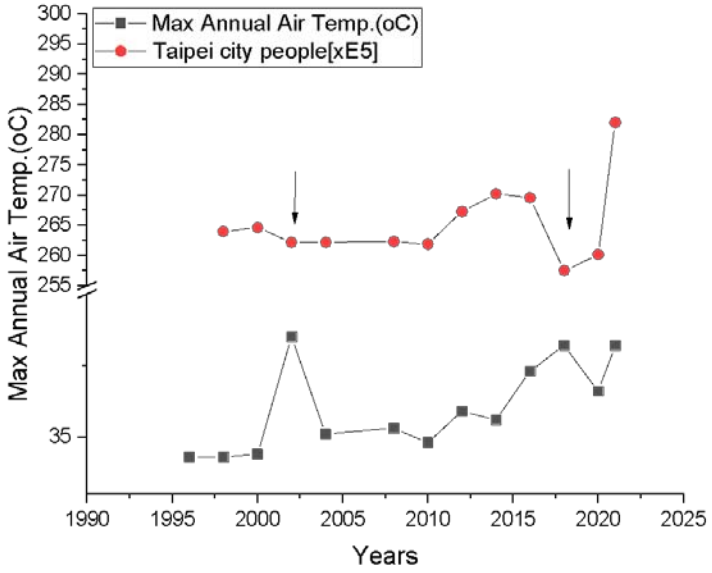


*Figure 7:* Average Atmospheric Temperature and Number of Remodeled Buildings in Taipei City for 1998-2021.

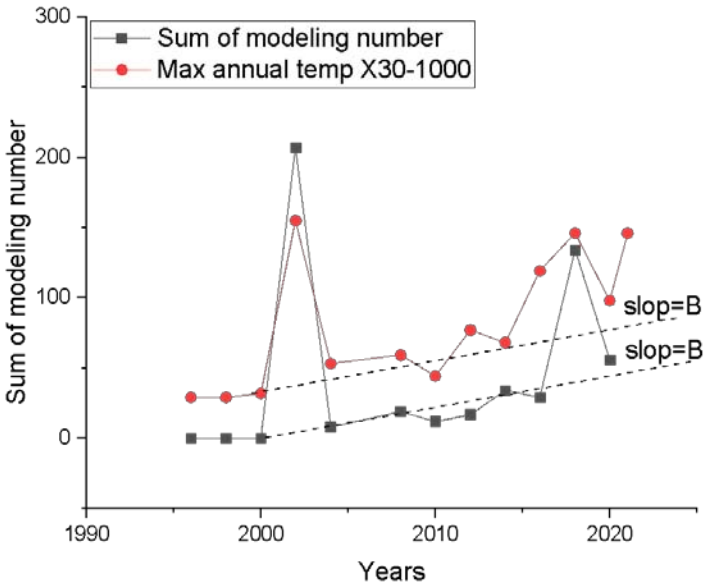


*Figure 8:* Average Air Temperature and Number of Remodeled Buildings in Taipei City for 1998-2021.



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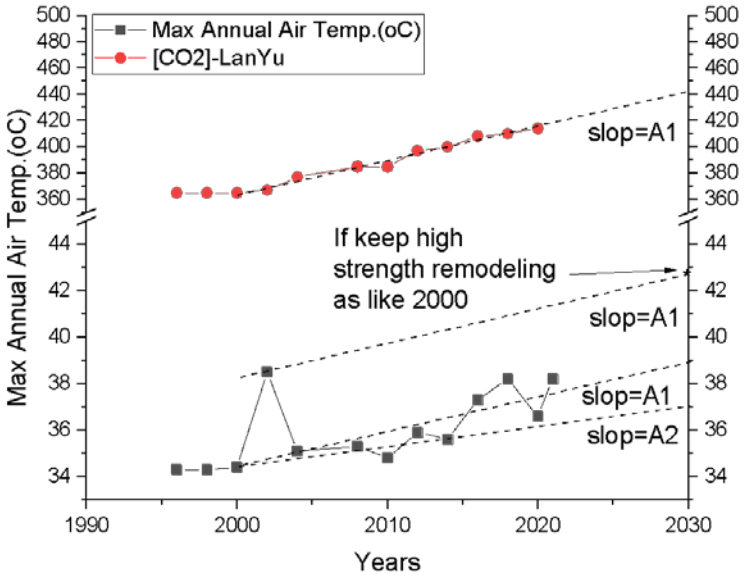


*Figure 9:* Maximum Outdoor Air Temperature and $CO_2$ Concentration in Taipei City for 1998-2021.

Figures 9 to 11 show that the amount of rain contributes directly to the A-type evaporation amount, and therefore the upcycle is related to this change. The rain amount is a macro-scale issue and is over the aim of this paper. We can attribute the dominated factor on affecting the A-type evaporation amount is the rain accumulation. The amount of the former impacts the upcycle of the sank heat. It means when there is less sank heat, there is less A type evaporation amount needed.

When the $CO_2$ concentration is fixed through maintaining the energy structure of a country, the urbane heat island effect could be addressed by adjusting the re-modeling timing of the second stage (i.e., 2008-2018 in Fig. 3) for A-type evaporation U shape-curve and not in the first stage (i.e.,1998-2008 in Fig. 3. From the data in Fig. 3, we observe that A-type evaporation amount has started to decrease year by year since 2018.

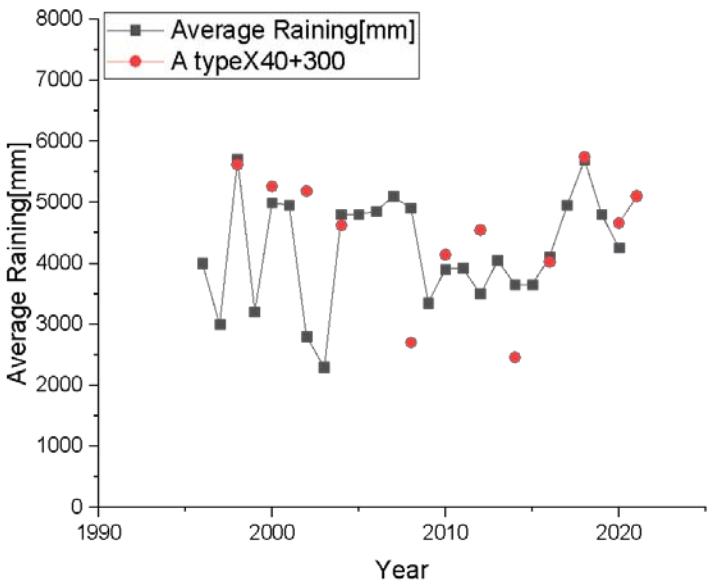


*Figure 9:* Accumulated Rain Amount and Amount of A-type Evaporation in Taipei City for 1996-2021.



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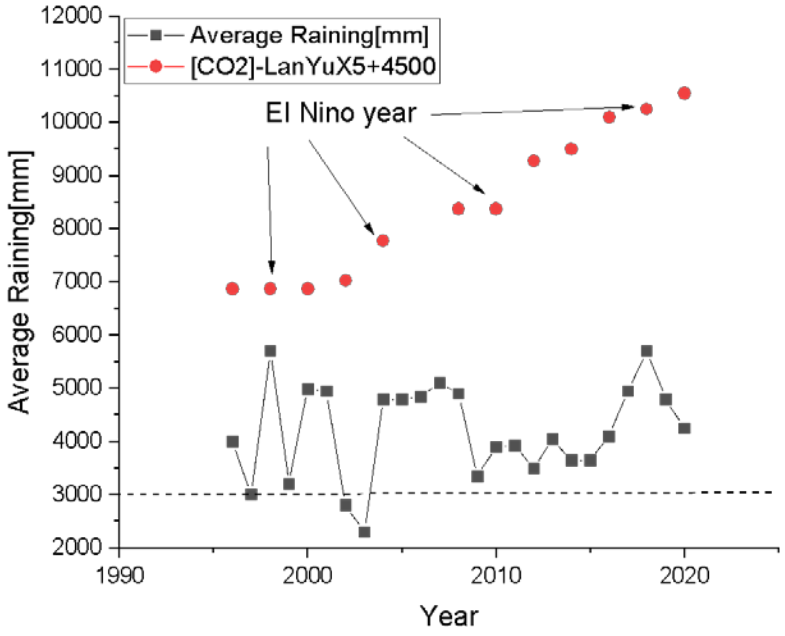


*Figure 10:* Accumulated Rain Amount and $CO_2$ Concentration in Taipei City for 1996-2021.

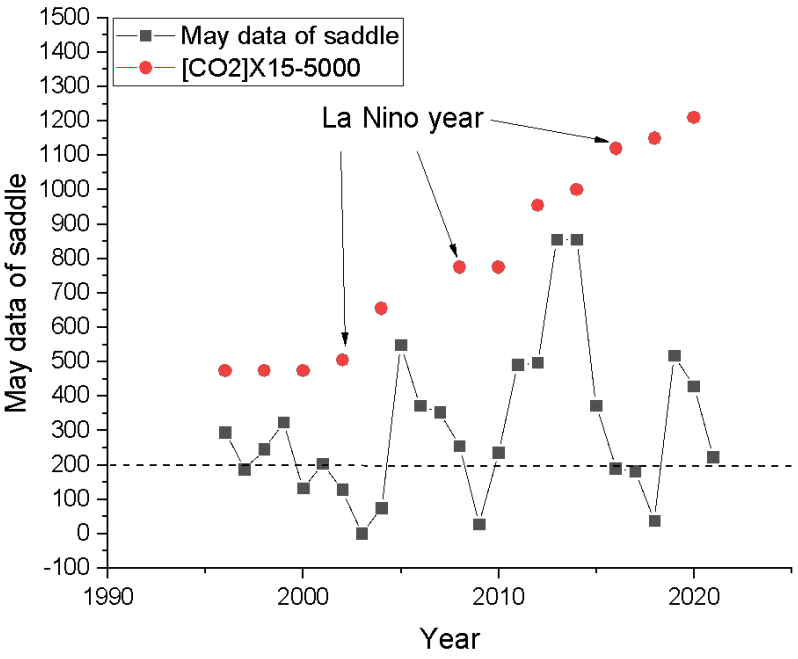


*Figure 11:* Monthly Rain Amount Data in May in Datunshan Saddle and $CO_2$ Concentration in Taipei City for 1996-2021.

Global warming means that global annual temperature increases since industrial evolution due to increase $CO_2$ and other pollutants are emitted and collected in the atmosphere. The urban atmospheric temperature is also raised. However, we cannot exclude the reverse theory - i.e., the urban heat island effect warms the outdoor air temperature. Thus, the urban heat island effect is the symptom of the global warming issue



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at a single city level in Taiwan. A shorter period (~10 years) has been observed in Fig. 2. When we separate the Kuznets infrastructural investment cycle (for example, new buildings) 1998-2021 into two parts, the first period would be located. Figure 12 shows the minimum annual outdoor air temperature with A-type evaporation amount in Taipei City from 1998 to 2021. The results demonstrate that this air temperature is controlled by an A-type evaporation amount with a V-shape Kuznets curve. Figure 13 shows the maximum annual outdoor air temperature with A-type evaporation in Taipei from 1998 to 2021. The results demonstrate that this air temperature is not related to A-type evaporation amount anymore, and the shape of the maximum annual air temperature is controlled by the public housing policy. The public housing policy does not contribute to the minimum annual air temperature in Fig. 12. In Fig. 13, the combined averaging air temperature is calculated from the minimum and maximum. The results show those two data (observed and combined averaging) perfectly fit each other.

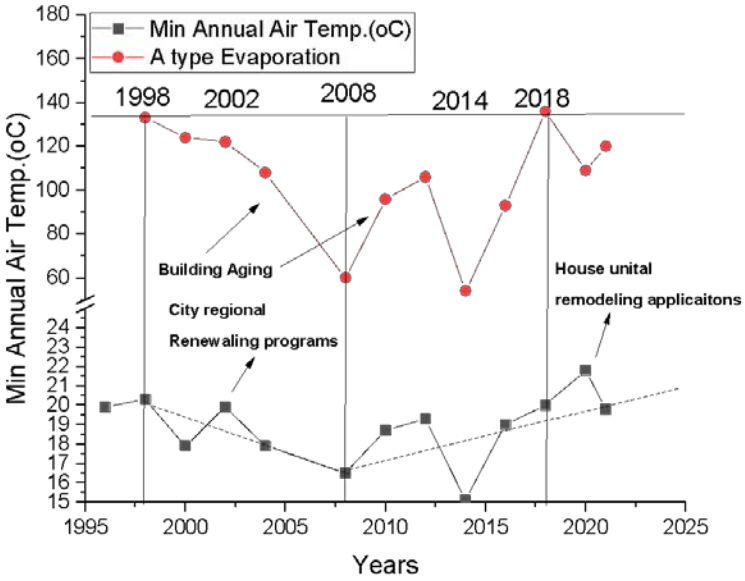


*Figure 12:* Minimum Annual Outdoor Air Temperature and A-type Evaporation Amount in Taipei City for 1998-2021.

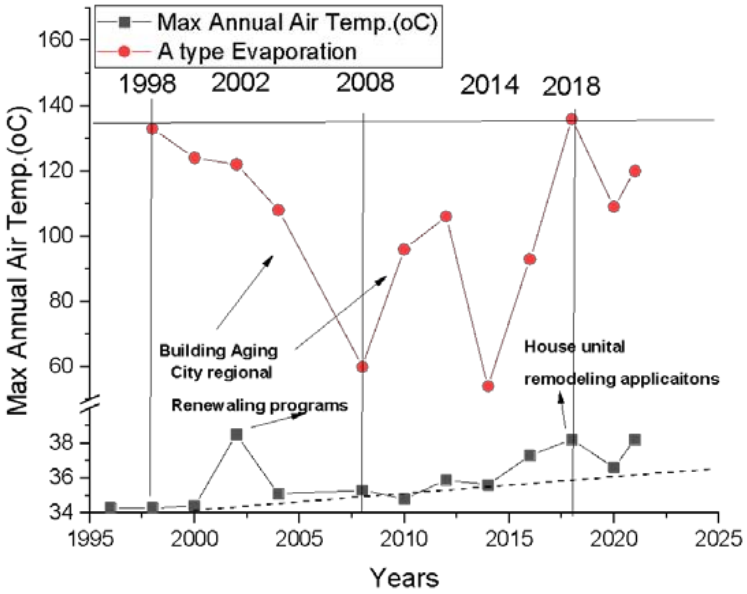


*Figure 13:* Maximum Outdoor Air Temperature and A-type Evaporation Amount in Taipei City for 1998-2021.



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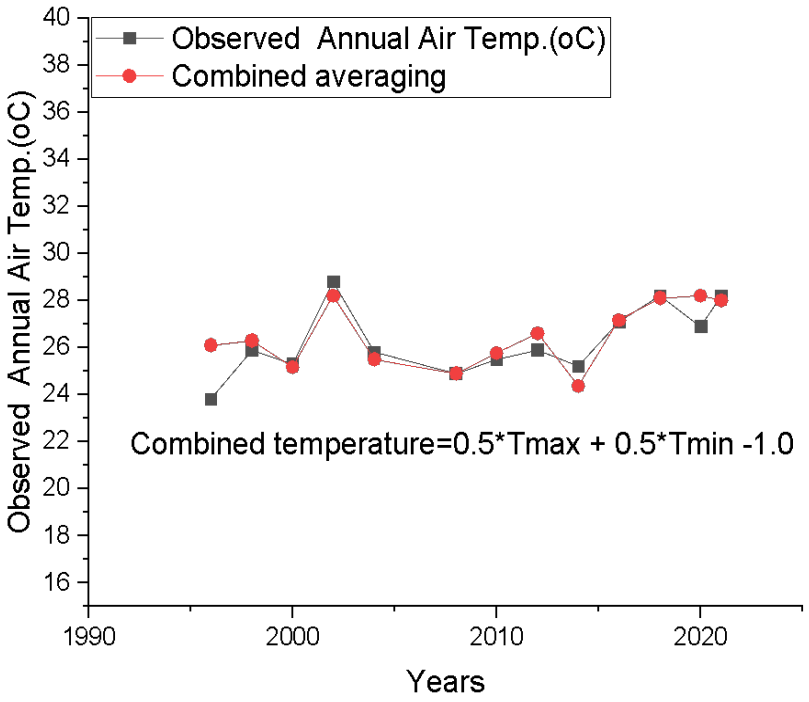


*Figure 14:* Average Atmospheric Temperature, Maximum Air Temperature, and Minimum Air Temperature in Taipei City for 1998-2021.

## IV. Concluding Remarks and Policy Implications

Countries the worldwide have made great efforts to reduce global warming for many years, with many international contracts trying to retard the incremental rate of atmospheric temperature. This present paper aims to explain the issue of the growth of atmospheric temperature. From our study, the factors influencing the growth of urban atmospheric temperature are the aging cycle of thermal conductivity inside concrete structures and the remodeling of old buildings in Taipei City, Taiwan, which is the biggest city and the capital city.

In Taiwan, the remodeling of old buildings is usually promoted by the local government policy, and from 2001 to 2020, more than 50% of cases were applied in Taipei City. 36.9% of buildings in Taiwan's capital, Taipei City, are over 40 years old, ranking first among all cities in Taiwan. Even when lacking data for remodeling engineering of old buildings 1998-2009 in Taipei City, the atmospheric temperature incremental rate 2001-2004 is similar to that of 2016-2021. We believe that remodeling should continue to occur, but from news reports in these years, the engineering was usually to prevent the falling of bricks on the exterior walls of old buildings. Thus, the A-type evaporation amount did not change for 2001-2004, due to the engineering using very little water. Conversely, the engineering that took place 2016-2021 consumed more underground water because the remodeling was for re-constructing the whole building.

Maintaining the atmospheric temperature in a big city cannot keep A-type evaporation. This point runs opposite to the currently popular strategy in the civil engineering field that recommends people to own plants and use building materials with high water penetration efficiency. Still, high thermal insulation bricks and painting are also recommended. Our results demonstrate that the surface heat source is the major contributor to atmospheric temperature. Such surface heat is produced from high thermal insulation bricks and painting after the remodeling of old buildings. In Taiwan, people use high thermal insulation bricks and painting to save the cooling electric power of those constructions, which increases the atmospheric temperature.

Moreover, $CO_2$ reduces the reflection efficiency of solar irradiation to outer space. One might ponder that $CO_2$ can be kept at the level of 2010 until 2021, then the temperature should be lower. However, the $CO_2$ concentration is almost similar for all cities in Taiwan, but only Taipei City has the highest urban heat island effect. It means that the dominated point is to keep the thermal transportation of the building to the soil rather than to isolate the building from the environment. The thermal balance of a building should be re-designed, and the interaction between the environment must be



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considered. The policy can be set up to advise this to reduce the urban heat island effect in the capital city.

## References Références Referencias


1. Aekbal Salleh, S., Abd. Latif, Z., Wan Mohd, W. M., Chan, A., Factors Contributing to the Formation of an Urban Heat Island in Putrajaya, Malaysia, 2013, Procedia - Social and Behavioral Sciences, 105, 840-850.
2. Chen, C.T. A., The role of the Pacific Ocean as a regulator of atmospheric carbon dioxide concentrations, Direct Ocean Disposal of Carbon Dioxide, Edited by Honda, N. and Ohsumi, T., Terra Publishing Company, 1995, pp. 23-34.
3. Chen, C.T. A., Bai, Y., Huang, T.H., He, X., Chen, H.W., Yu, S., Southward spreading of the Changjiang Diluted Water in the La Niña spring of 2008, Scientific Report 2021, 11, pp. 1-11.
4. Egli, H., Steger, T. M., A Dynamic Model for the Environmental Kuznets Curve: Turning point and Public Policy, Environmental & Resource Economics, 2007, 36, pp. 15-34.
5. Grossman, G. M., Krueger, A. B., Environmental Impacts of a North American Free Trade Agreement, National Bureau of Economic Research, 1991, Working paper No. 3914.
6. Huang, W.-J., Driving Force of Environmental Kuznets Curve (EKC) Pattern on Energy Intensity in Taiwan at 1995-2015: Empirical Evidence of Exogenous Event Transformed to Endogenous Policies Effect, Review of Integrative Business and Economics Research, 2020, 9, pp. 333-339.
7. Huang, W.-J., Formation Mechanism of the Perfect Inverted V-Shape $CO_2$ Emission Amount Environmental Kuznets Curve (EKC) the Country Level: Taking Taiwan as an Example, 2021, Journal of Economics, Management and Trade, 2021, 27, pp. 1-6.
8. Kong, Y., Khan, R., To examine environmental pollution by economic growth and their impact in an environmental Kuznets curve (EKC) among developed and developing countries, 2019, PLOS ONE, 14, e0209532, pp.1-23.
9. Kurokawa1, J., Ohara, T., Long-term historical trends in air pollutant emissions in Asia: Regional Emission inventory in Asia (REAS) version 3.1, 2020, Atmos. Chem. Phys., 20, pp. 12761–12793.
10. Kuznets, S. Economic growth and income inequality, American Economic Review, 1955, 45, pp. 1-28.
11. Li, Y., Sebastian Schubert, S., Kropp, J. P., Rybski, D., On the influence of density and morphology on the Urban Heat Island intensity, 2020, Nature Communication, 11, 2647-2656.
12. Energy Policy, 2016, 91, pp. 138-147. Li, T., Wang, Y., Zhao, D., Environmental Kuznets Curve in China: New Evidence from Dynamic Panel Analysis.
13. Miao S., Chen F., Enhanced modeling of latent heat flux from urban surfaces in the Noah/single-layer urban canopy coupled model, 2014, Sci China Earth Sci., 57, 2408–2416.
14. USEPA (2017). Heat Island Effect. Retrieved from: USEPA Website. https://www.epa.gov/heat-islands
15. Yang, J., Menenti, M., Krayenhoff, E. S., Wu, Z., Shi Q., Ouyang, X., Parameterization of Urban Sensible Heat Flux from Remotely Sensed Surface.
16. Temperature: Effects of Surface Structure, Remote Sensing. 2019, 11, 1347-1366.
17. Yu, Y., Chen, L., Research progress of the Environmental Kuznets Curve (EKC) in China, Ecology and Environmental Sciences, 2012, 21, pp. 2018-2023.




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# Cálculo Situacional a Estratégia em Quaisquer Circunstâncias

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*Abstract-* This work addresses the ability of an agent to not have to adapt to change; but rather force others to adapt, by manipulating the environment. This implies ability to influence others and ability to ignore their interests and actions.

To this end, in selected aspects, the Situational Strategic Planning (PES) as formulated by Carlos Matus in his book 'Goodbye, Mr. President' (MATUS, 1996) with teachings by Miyamoto Musashi in the work 'Gorin No Sho' (MUSASHI, 1992). Epistemologically the work is conducted by the vision underlying the evolution of the concept approached as object. As a method of investigation, the bibliographical research of seminal works was privileged.

The text is structured in four sections. The Presentation raises the question to be addressed in the article, the methodology and the limits and expectations of results. The Introduction places the reader on the object to be addressed in the main section. The following section Calculation and Interactive Situation constitutes the development of the argumentation and precedes the Final Considerations that closes the exposure of the proposed reasoning. The bibliographic references close the work.

*Keywords:* *situational strategic planning; strategy; circumstances; situation.*

*GJHSS-E Classification:* *FOR Code: 149999*




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# Cálculo Situacional a Estratégia em Quaisquer Circunstâncias

José Dalmo Silva de Souza [α], Dieter Rugard Siedenberg [σ] & Sérgio Luís Allebrandt [ρ]

*Resumo-* Esse trabalho aborda a habilidade de que dispõe um agente para não ter que se adaptar às mudanças; mas antes forçar os outros a se adaptarem, através da manipulação do ambiente. Isso implica capacidade de influenciar os outros e habilidade de ignorar seus interesses e ações.

Para isso contrasta, em aspectos selecionados, o Planejamento Estratégico Situacional (PES) conforme formulado por Carlos Matus em seu livro '*Adeus, senhor presidente*' (MATUS, 1996) com ensinamentos de Miyamoto Musashi na obra '*Gorin No Sho'* (MUSASHI, 1992). Epistemologicamente o trabalho é conduzido pela visão subjacente à evolução do conceito abordado como objeto. Como método de investigação privilegiou-se a pesquisa bibliográfica de obras seminais.

O texto está estruturado em quatro seções. A Apresentação coloca a questão a ser tratado no artigo, a metodologia e os limites e expectativas de resultados. A Introdução situa o leitor quanto ao objeto a ser abordado na seção principal. A seção seguinte Situação Cálculo e Interativo constitui o desenvolvimento da argumentação e precede às Considerações Finais que fecha a exposição do raciocínio proposto. As Referências bibliográficas encerram o trabalho.

*Palavras chave: planejamento estratégico situacional; estratégia; circunstâncias; situação.*

*Abstract-* This work addresses the ability of an agent to not have to adapt to change; but rather force others to adapt, by manipulating the environment. This implies ability to influence others and ability to ignore their interests and actions.

To this end, in selected aspects, the Situational Strategic Planning (PES) as formulated by Carlos Matus in his book '*Goodbye, Mr. President* (MATUS, 1996) with teachings by Miyamoto Musashi in the work '*Gorin No Sho'* (MUSASHI, 1992). Epistemologically the work is conducted by the vision underlying the evolution of the concept approached as object. As a method of investigation, the bibliographical research of seminal works was privileged.

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*Keywords: situational strategic planning; strategy; circumstances; situation.*

## I. Apresentação

Esse trabalho aborda a habilidade de que dispõe um agente para não ter que se adaptar às mudanças; mas antes forçar os outros a se adaptarem, através da manipulação do ambiente. Isso implica capacidade de influenciar os outros e habilidade de ignorar seus interesses e ações (BURTON, 1968. Apud CARVALHO, 1982). Em última análise este é um texto sobre poder efetivamente fazer prevalecer e implementar as intenções próprias sobre as demais alternativas ou, '*simplesmente'*, derrotar o adversário.

O objetivo do presente estudo consiste do desafio de expor um *insight* cujo objetivo ao ser transformado em texto não é outro senão contribuir com subsídios para a reflexão própria leitor. Para isso contrasta, em aspectos selecionados, o Planejamento Estratégico Situacional (PES) conforme formulado por Carlos Matus em seu livro '*Adeus, senhor presidente*' (MATUS, 1996) com ensinamentos de Miyamoto Musashi na obra '*Gorin No Sho'* (MUSASHI, 1992). Epistemologicamente o trabalho é conduzido pela visão subjacente à evolução do conceito abordado como objeto. Como método de investigação privilegiou-se a pesquisa bibliográfica de obras seminais.

Dado que a pretensão não ultrapassa alinhar alguns pontos de convergência entre o PES e a aplicação marcial no campo dos negócios e empreendedorismo, a estratégia, consideração global de todos os aspectos envolvidos em uma disputa (BARROS, 1992). Como não se trata de expor o Planejamento Estratégico Situacional em sua totalidade

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e nem tampouco em discorrer de maneira exaustiva sobre a estratégia desenvolvida no *Gorin no Sho* convém, neste momento, tecer alguns comentários acessórios para situar os leitores na temática de que Planejamento e Estratégia são aspectos universais da vida.

Musashi, nascido em 1584 e falecido em 1645 (REISCHAUER, 1999) revelou-se espadachim aos treze anos e percorreu um cotidiano de duelos – mais de sessenta - até os trinta anos de idade. Depois se retirou da vida de confrontos para refletir sobre a vida e aos cinquenta anos de idade escreveu o Gorin no Sho. Vale a observação: o literato refletiu e sistematizou o que o espadachim realizou. Matus almejou sistematizar uma forma de planejamento - cálculo que precede e preside a ação - e desenvolveu seus conceitos e fundamentos bem como modelou instrumentos. O PES admite duas aplicações, a saber, em macro organizações e em micro organizações. A macro organização é um jogo no qual cada organização participante é um jogador com um grau de autonomia. Não há relações hierárquicas entre jogadores. A micro organização é regida pela lógica da coordenação em um sistema hierárquico que se mantém pela capacidade de emitir diretrizes, por parte do chefe, e pela vontade de obedecê-las, por parte dos subordinados (MATUS, 1996). Neste trabalho, por limitação de extensão do texto, limitaremos nossa abordagem de aspectos da aplicação do PES em macro organizações.

O texto está estruturado em quatro seções. A Apresentação coloca a questão a ser tratado no artigo, a metodologia e os limites e expectativas de resultados. A Introdução situa o leitor quanto ao objeto a ser abordado na seção principal. A seção seguinte Situação Cálculo e Interativo constitui o desenvolvimento da argumentação e precede às Considerações Finais que fecha a exposição do raciocínio proposto. As Referências bibliográficas encerram o trabalho.

## II. Introdução

Governar é construir o futuro do sistema através da tomada de decisões críticas (DROR, 1994). Saber usar os recursos de que se dispõe de maneira otimizada em relação aos objetivos, implica planejamento quanto à própria ação e assim, quer se trate de governar a própria vida ou de sociedades, a ação sói ser precedida e presidida por um cálculo racional. Do ponto de vista ortodoxo (GRISON, 2016) estratégia

> "(...) pode ser conceituada como um conjunto de recursos (materiais, financeiros, humanos, administrativos, relacionais, de experiência, de liderança, tecnológicos etc), utilizados de um determinado modo, para produzir determinados resultados (realizar objetivos) num determinado contexto. Os elementos ou componentes que constituem uma estratégia, portanto, são: os recursos, o modo de utilizá-los, os resultados pretendidos (objetivos) e o contexto. As estratégias podem, pois, variar em função da variação de cada um ou de diversos destes componentes ou elementos."

A ação constrói o futuro de acordo com a situação em que foi empreendida. Para o cálculo racional referente à posição do agente ser eficiente deve-se considerar como variável principal a circunstância, ou seja, segundo Ortega y Gasset (1936, 82. Apud MATUS, 1996, 149-0) a restrição da realidade situacional particular vivida pelo homem e que marca para ele com um perfil ideal aquilo que é preciso fazer. Assim, em uma interação de agentes, cada um vive uma situação diferente diante das mesmas circunstâncias que os envolve a todos pois entender uma coisa que nos afeta não é somente somar dados e informações mas, antes de tudo, processar essas entradas e dar-lhes significado segundo nossa visão e nossos preconceitos.

Planejar, introduzir racionalidade na ação (ANDER-EGG, 1995; SIEDENBERG, 2010), portanto, não é uma atividade que se processa no vácuo mas que acontece em uma rede de interações dinâmicas no tempo na qual, por sua vez, ao mesmo tempo que o condiciona é por ele também transformada. Os agentes escolhem seu plano de ação, mas não podem escolher as circunstâncias na qual ele se será executado.

Como o ator que planeja compartilha a realidade e, portanto, as circunstâncias com outros agentes que também planejam, necessariamente o planejamento abrange a questão de vencer ou minar a resistência dos demais planos que não sejam o seu próprio. Assim, segundo MATUS (1996) o planejamento não deve ser confundido com uma definição normativa do '*deve ser*', mas sim englobar o '*pode ser*' e a '*vontade de fazer*'. No caso de um plano de governo, por exemplo, para se cumprir o planejamento não basta manipular a realidade econômica, mas também mas também exigir que os planos dos outros sejam derrotados ou que os adversários sejam conquistados para o próprio plano.

Para Musashi (1992, 41) a Estratégia é a Arte Militar, Caminho ou Tao do Samurai segundo GRANET (1997) e, assim, transcende à técnica de utilização da espada como arma de combate. Trata-se de uma senda divina dada ao Homem para ser percorrida dentro de um código de conduta que lhe permite enfrentar a certeza da morte e, enquanto essa não acontece, triunfar nos diversos desafios que a vida impõe (RATTI; WESTBROOK, 2006; TSUNETOMO, 2004; YUZAN, 2003; SHIGESUKI, 2004). A Estratégia é a arte de vencer.

Segundo o espadachim em um duelo por vingança não se deve considerar ferir o inimigo de um modo específico e sim, abatê-lo. Ao usar a espada não se pensa em outra coisa senão causar danos e vencer o inimigo. Mas, sobretudo, em qualquer combate não

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se deve levar em conta métodos irracionais e sim "o espírito de buscar o triunfo com o poder da inteligência da arte militar' (MUSASHI, 1992, 135-6). Isso porque quer no embate individual, quer na arte militar aplicada ao combate de grandes exércitos quando se procura vencer o combate somente através da força, o inimigo poderá fazer o mesmo e utilizar considerável força de modo a se estabelecer um equilíbrio de poder. Por isso, em tudo, para vencer, é necessário recorrer à razão. "Acima de tudo, você precisa querer abater o inimigo a partir do modo como sustenta a espada" (TZU et ali, 2004, 180).

Estratégia é a arte de vencer não só o adversário em si, mas também os obstáculos ao plano e levar o agente a obter sucesso em suas intenções. Segundo Matus (1996, 68) "exigir que os planos dos outros sejam derrotados", segundo Musashi (1992, 75) "a determinação de cortar o adversário". Considerando-se com a devida atenção que se trata do tema da estratégia em diferentes tratamentos por seus respectivos autores, nota-se a convergência dos conceitos e dos pressupostos entre Matus e Musashi. Assim como para Matus planejamento é *planejamento estratégico situacional* sendo as demais formas conhecidas apenas formas imitativas ou incompletas; assim também, a *estratégia* para Musashi é *Niten-Ichi*, sua escola, sendo as outras, incompletas ou decorativas.

Embora o conceito de '*situação*' não seja esclarecido na obra oriental, percebe-se ser idêntico ao utilizado no PES. O agente está *envolvido em uma situação* e a avalia de sua perspectiva particular. As circunstâncias também são únicas e iniludíveis. Assim, tudo quanto é circunstancial é digno de registro e atenção (mesmo que para posterior descarte) pois serve tanto a um lado quanto ao outro. É a capacidade de comando das variáveis – quantidade e qualidade – que proverá maiores chances de se impor as intenções ao outro lado ao assegurar um maior grau de governabilidade do sistema a uma das partes. Isso exige preparo técnico (PES-*Niten-Ichi*).

O Caminho do Samurai é um só, todavia, as circunstâncias são inconstantes e singulares. É preciso conhecer o adversário para entender suas motivações e capacidades e perceber a situação pelo seu ponto de vista e, assim, antecipar-se às suas indicações ou, segundo Matus, "conhecer suas respostas". E é preciso agir, de acordo com a avaliação do momento e, por conseguinte, desconcertar o adversário. Agir estratégico-situacionalmente é esconder o espírito e mantê-lo sempre constante, pronto para adaptar-se às circunstâncias de cada situação que traz, em seu bojo, o respectivo adversário em questão.

> Em qualquer circunstância, ao perseguir o adversário, deve colocá-lo em lugar difícil de pisar, onde haja obstáculos dos lados, de forma que você possa aproveitar a superioridade das condições do local para vencer" (MUSASHI, 1992, 102-3).

Para (CLAUSEWITZ, 1972. Apud MATOS, 1996, 129) é um fato de que enquanto o adversário não é vencido nenhum dos dois combatentes é dono de si mesmo posto que um força a mão do outro da mesma forma como a sua própria é forçada pela mão daquele. Assim, a cada ação de um ator correspondem reações dos demais atores. Nesses casos, segundo Matus (1996) o planejamento não conta mais com cálculo paramétrico (determinístico) e sim, com um cálculo interativo em que se estabelece a interdependência das decisões mais eficazes e o mútuo condicionamento das incertezas.

> "O cálculo interativo é um cálculo situacional e dá origem a um sistema recursivo, em que a eficácia de cada movimento de um ator depende do movimento do outro. Se a interação for conflitiva, o melhor movimento do ator 'A' é aquele que deixa seu adversário na situação mais difícil" (MATUS, 1996, 113).

Como visto, para os dois autores a ação deve seguir um *plano* e ser executada segundo a oportunidade (situação). No entanto, é necessário registrar uma distinção importante entre PES e *Niten-Ichi*. Ambos avaliam a situação e nesta, as circunstâncias, porém o fazem com perspectivas diametralmente opostas. Segundo (JULLIEN, 1998) a tradição europeia herdada de formas ideais dos gregos clássicos pensa a eficácia edificada em modelos que se projetam sobre o mundo e que a vontade teria como meta realizar. Para o pensamento oriental, a eficácia da ação é obtida a partir de se deixar advir o efeito, não a visá-lo diretamente, mas a implicá-lo como consequência.

Desse modo, no PES vige a lógica da relação teoria-prática do protagonismo na ação, dos meios e dos fins. Conta-se com ferramentas para atingir o efeito desejado. No *Niten-Ichi* a inteligência não passa pela relação teoria-prática, mas se apoia apenas na evolução das coisas. Saber tirar proveito daquilo que se acha implicado pela situação e que é prometido por sua evolução pois o potencial é diferente e superior a um simples concurso de circunstâncias e preso na lógica de um desenvolvimento regulado evolui espontaneamente e 'porta' os atores sem que estes gastem energia em tentar modificá-lo.

O ponto a destacar é que em MATUS percebe-se o pensamento ocidental de preparar-se com a melhor tecnologia – de planejamento, de equipamento, de técnica – para construir um resultado, a vitória. Em MUSASHI impregna o pensamento oriental de preparar-se com a melhor tecnologia – de planejamento, de equipamento, de técnica – para recolher o resultado do processo. Em ambos os conceitos de situação e circunstâncias são fundamentais, assim como o do cálculo que precede e preside a ação. Mas esse



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aparente tão perto, revela-se verdadeiramente como tão longe.

## III. Situação e Cálculo Interativo

Em oposição a um universo fechado e determinístico em um universo teórico desconhecido os processos são de inteligência aberta, pois detém a propriedade de serem alterados através da *interação* com o sistema que o abrange e de modificarem a si mesmos em um processo de *iteração* em que cada modificação sofrida se constitui a base para nova mudança no porvir. Neste sentido, assim como o PES, a *Niten Ichi* amplia o potencial do ator em buscar o sucesso de suas intenções (imposição do plano). Como a produção social é um jogo interativo – o futuro é sempre uma novidade – não é adequado usar comportamentos pré-estabelecidos e fixos para determinar as ações que construirão o futuro a partir do presente inconstante. Como cada combate é uma situação específica, dentro do Caminho do Guerreiro há que se ter uma estratégia para condutas flexíveis e eficazes. Uma estratégia para vencer sempre.

Matus (1996) recomenda a *técnica do jogo* que consiste basicamente em se verificar empiricamente qual fração do universo desconhecido de possibilidades é mais provável de existência real. Torna-se, assim, possível planejar a partir da experiência prática ou jogo simulado, pois se conhece o universo cognoscível do problema e em algum grau suas probabilidades. Neste cenário atores não obedecem a uma mesma ordem e interagem em um jogo competitivo entre desiguais em que a regras por serem historicamente cumulativas, ao mesmo tempo que impedem o caos também regulam as vantagens adquiridas por alguns jogadores em detrimento de outros.

Explicar é diferenciar as indicações dos diversos atores e atribuir corretamente a cada jogador as explicações diferenciadas. Assim, o cálculo interativo exige que se tente conhecer as motivações e as possíveis ações do adversário e estas não dependem da explicação própria que o ator possui e sim, da explicação do adversário. Por isso existe uma assimetria latente de explicações em um sistema interativo para uma mesma realidade pois comporta tanto a existência de respostas diferentes às mesmas perguntas quanto de perguntas diferentes e suas respectivas respostas diferentes por parte de cada ator.

Musashi (1992) expõe o espírito de sua escola de estratégia com a imagem água, ou seja, maleabilidade, flexibilidade e limpidez. Toma imediatamente a forma de seu recipiente e apresenta-se tanto como uma gota quanto como o próprio oceano. No entanto, é sempre ela mesma. De imediato percebe-se a adaptabilidade exigida a cada circunstância em situações específicas e segundo uma determinação particular do agente (FUNAKOSHI, 2005). Esta propriedade é uma acumulação, ou seja, o indivíduo se diferencia em sua própria história. A intencionalidade dessa transformação é tanto uma determinação social (responsabilidade do samurai) quanto uma questão pessoal (diligência). Neste sentido, o *Bushido (Código de Cavalaria)* estabelece as *regras fundantes* sob as quais o samurai atua. Estabelece as armas, as normas e a forma de conduta, incluindo, especialmente, a obediência às leis como valor basilar (YUZAN, 2003).

Para Musashi (1996) a questão fundamental é uma indicação de ação, portanto, pressupondo uma distinção e a respectiva e consequente explicação. Mas isso advém de uma avaliação por contraste entre a explicação própria e a do oponente. Somente assim uma situação pode ser apreendida, pois esta contém em suas circunstâncias o adversário e, obviamente, sua própria explicação. Trata-se, portanto, de antecipar as perguntas e as respostas do inimigo. Um legítimo "jogo psicológico". Conhecer o oponente ou "transformar-se no inimigo é colocar-se no lugar do adversário (MUSAHI, 1996, 112). Ao mesmo tempo, cada ator está potencialmente sujeito à mesma desventura de ver-se como objeto do outro, sendo, portanto, fundamental, se proteger contra o perigo de uma sondagem situacional. "Mantenha o seu espírito sempre inescrutável para os outros" (MUSAHI, 1996, 71-2).

A estratégia é ditada pela mente, mas executada pelo corpo através da espada. A um espírito afiado deve corresponder um corpo suficiente para cumprir as determinações do espírito. Neste sentido é que entra o aspecto técnico, o treinamento que visa integrar tudo está dito na disciplina ao seu próprio corpo até o ponto de não perceber que aquilo que foi assimilado não são vantagens criadas pelo próprio espírito. Se no início o agente é escravo da técnica pois está preso a ela, com o tempo torna-se mais livre e, a partir de certo ponto, assume a posição de senhor (FUNAKOSHI, 2005, 93-4).

Da mesma forma como o PES recorre à técnica de jogo a *Niten Ichi* recorre ao treinamento árduo. Ambos buscam captar aspectos da realidade no sentido de captar a ação mais eficaz diante das ações e reações do oponente. Essa flexibilidade mental (do espírito) que se traduz em uma flexibilidade física de postura (ação) compõe um uso elevado da técnica, sua superação e não, seu abandono. O teste final é o embate, seja como desafio (luta que não termina intencionalmente em morte) ou duelo (confronto decidido pela morte). O combate tem o mesmo aspecto da simulação ou Técnica do Jogo em Matus pois permite reduzir o universo aberto e desconhecido do conflito a um universo prático passível de avaliação. O confronto subsidia, complementa e ao mesmo tempo é alimentado por outras formas de 'transformar-se no inimigo'. Conhecer as outras escolas e os oponentes



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em potencial reduz a incerteza do que se pode enfrentar em um combate e lapida a flexibilidade adaptativa apontando atalhos na antecipação das intenções e consequentemente dos movimentos do adversário. Se a produção social é um jogo competitivo entre desiguais, é preciso que haja eficiência na acumulação proporcionada pelas regras do jogo. O objetivo da *Niten Ichi* não é outro senão o do PES, ou seja, elevar essa desigualdade a favor de seu praticante.

## IV. Considerações Finais

O conhecimento possibilita ganho de liberdade para decidir entre um número maior de opções de ações. O planejamento é uma mediação entre o conhecimento e a ação e se constitui no cálculo que precede e preside a ação humana. Mas esse planejamento pode apresentar-se de modo paramétrico (LOPES, 1990) ou situacional.

Quer se entenda estratégia como uma forma de se construir a trajetória do sistema ao se manipular as variáveis adotando-se o cálculo interativo em um sistema criativo em que o futuro não é descoberto e sim feito ou criado; quer se entenda estratégia como a ação inteligente de se posicionar para recolher os efeitos das causas em movimento deixando-se o processo resultar segundo as próprias forças em suas lógica e automaticidade para atingir o desfecho desejado o ator *encontra-se envolvido em uma situação* e dialoga com sua circunstância única e iniludível.

Dessa forma um sistema não oferece a mesma governabilidade a todos os diferentes atores sociais, pois cada um controla porções diferentes de variáveis do sistema e assim, o problema teórico com que se depara a elaboração do cálculo é o fato de que o sistema como situação conflitiva de inter-relações de atores inclui variáveis incertas ou desconhecidas.

Para cada agente esse cálculo é único e comporta tanto uma parte técnica (conhecimento adquirido) quanto um elemento de interpretação subjetiva da realidade. Na ação ambos os componentes dialogam entre si. O cálculo que precede e preside a ação é situacional pois é determinado em função da significação dos dados e informações segundo a visão e preconceitos do ator que planeja e age em determinada circunstância.

## References Références Referencias


1. ANDER-EGG, E. *Introducción a la Planificación*. Buenos Aires: Editorial Lumen, 1995.
2. BARROS, B. F. de. A Arte da Vitória Segundo o Espadachim Invencível. (Prefácio). *In:* MUSASHI, M. *Gorin No Sho – a estratégia de vencer sempre*. São Paulo: Cultura Editores Associados, 1992.
3. BURTON, J. W. "Systems, states, diplomacy and rules". Cambridge, Cambridge University Press, 1968. Citado em: KEONE, R.O; OOMS, V.D. A Empresa Multinacional e a Política Econômica Mundial". *In:* Carvalho, G. (Org). Multinacionais – os limites da soberania. Rio de Janeiro: FGV, 1982.
4. DROR, Y. *A Capacidade para Governar: informe ao Clube de Roma*. São Paulo: Edições FUNDAP, 1994.
5. FUNAKOSHI, G. *Os Vinte Princípios Fundamentais do karatê – o legado espiritual do mestre*. São Paulo: Cultrix, 2005.
6. GRANET, M. *O pensamento chinês*. Rio de Janeiro: Contraponto, 1997.
7. GRISON, A. J. *Correspondência Pessoal ao Autor*. Ijuí, 2016.
8. JULLIEN, F. *Tratado da Eficácia.* São Paulo: Editora 34, 1998.
9. LOPES, C. T. G. Planejamento, Estado e Crescimento. São Paulo: Pioneira/Novos Umbrais, 1990.
10. MATUS, C. *Adeus, senhor presidente – governantes governados*. São Paulo: Edições FUNDAP, 1996.
11. MUSASHI, M. *Gorin No Sho – a estratégia de vencer sempre*. São Paulo: Cultura Editores Associados, 1992.
12. RATTI, O.; WESTBROOK, A. *O Segredo dos Samurais – as artes marciais do Japão feudal*. São Paulo: Madras, 2006.
13. REISCHAUER, E. O. Prefácio. *In:* YOSHIKAWA, E. *Musashi* (2 vol). São Paulo: Estação Liberdade, 1999.
14. RODRIGUES, R. D. Um Livro de Cinco Aneis: Gorin no Sho. *In:* TZU, S. et alli. *Sábios Guerreiros*. São Paulo: Editora Claridade, 2004.
15. SENGER, H. von. *O Livro dos Estratagemas – a arte da guerra para executivos e profissionais*. Rio de Janeiro: Ediouro, 1997.
16. SIEDENBERG, D. R. (Org). *Fundamentos e Técnicas de Planejamento Estratégico Local/ Regional*. Santa Cruz do Sul: EDUNISC, 2010.
17. TSUNETOMO, Y. *Hagakure – o livro do samurai*. (organização Willian Scott Wilson). São Paulo: Conrad Editora do Brasil, 2004.
18. TZU, S. *A Arte da Guerra*. São Paulo: Cultura Editores Associados, 1994.
19. TZU, S. et alli. *Sábios Guerreiros*. São Paulo: Editora Claridade, 2004.
20. YUZAN, D. *Bushido – o código do samurai*. São Paulo: Madras, 2003.




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# Contribution des Footballeurs Africains sur le Niveau de Jeu en Europe

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*Abstract-* The objective of this study is to highlight the contribution of African footballers on the level of game in Europe. To achieve this objective, we used a hypothetico-deductive method which consists in constructing responses to the phenomenon studied on the basis of theoretical or empirical literature. This method was supplemented by the presentation of some statistics obtained after using the website of FIFA (International Federation of Association Football), UEFA (Union of European Football Associations) and CIES (International Centre for Sports Studies). It has been noted that from the 1980s to the present day, several African players have contributed to effectively raising the standard of football in Europe. Indeed, several African players have scored goals in the final of Europe's most prestigious club competition. In addition, at least fifteen Africans have won a C1 final.

*Keywords:* *africa; footballers; game; Europe.*

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# Contribution des Footballeurs Africains sur le Niveau de Jeu en Europe

Joel Stephan Tagne

*Résumé-* L'objectif de cette étude est de mettre en évidence la contribution des footballeurs africains sur le niveau de jeu en Europe. Pour atteindre cet objectif, nous avons fait recours une méthode hypothético-déductive qui consiste à construire des réponses au phénomène étudié sur la base de la littérature théorique ou empirique. Cette méthode a été complétée par la présentation de quelques statistiques obtenues après exploitation du site de la FIFA (Federation Internationale de Football Association), d'UEFA (Union of European Football Associations) et du CIES (Centre International d'Etude du Sport). Il a été constaté que depuis les années 1980 jusqu'à nos jours, plusieurs joueurs africains ont contribué à rehausser effectivement le niveau de football en Europe. En effet, plusieurs joueurs africains ont inscrit des buts lors de la finale de la plus prestigieuse des compétitions de clubs en Europe. En plus, au moins quinze africains ont été vainqueurs d'une finale de C1.

*Mots-clés: footballeurs ; afrique ; jeu ; europe.*

*Abstract-* The objective of this study is to highlight the contribution of African footballers on the level of game in Europe. To achieve this objective, we used a hypothetico-deductive method which consists in constructing responses to the phenomenon studied on the basis of theoretical or empirical literature. This method was supplemented by the presentation of some statistics obtained after using the website of FIFA (International Federation of Association Football), UEFA (Union of European Football Associations) and CIES (International Centre for Sports Studies). It has been noted that from the 1980s to the present day, several African players have contributed to effectively raising the standard of football in Europe. Indeed, several African players have scored goals in the final of Europe's most prestigious club competition. In addition, at least fifteen Africans have won a C1 final.

*Keywords: africa; footballers; game; Europe.*

## I. Introduction

Les flux économiques liés au sport n'ont véritablement pris une ampleur internationale qu'après la seconde guerre mondiale, surtout au cours du dernier quart de siècle avec la multiplication des spectacles sportifs internationaux, la retransmission internationale de ces spectacles, le commerce mondial des articles de sport, la délocalisation internationale de la production de ses articles, les transferts internationaux d'athlètes contre rémunération etc (Bourg et al., 1989). S'inscrivant fréquemment dans la tradition de l'Economie Politique, les travaux des chercheurs principalement couvrent l'ensemble des phénomènes concrets mettant en relation les activités sportives et les activités économiques avec leurs externalités positives ou négatives. C'est ainsi que sont analysés les différents marchés du sport, notamment professionnels, avec leur histoire économique, leur poids financier (part du PIB) et leur régulation (Andreff, 2010 et 2012 ; Bourg et Gouguet, 2012) ; les flux de biens et de service (articles de sport, spectacles sportifs directs et indirects) ; l'internationalisation de la mobilité des facteurs de production et la stratégie globale des agents économiques et sportifs (Andreff, 2010 et 2012) ; le marché du travail sportif (Bourg, 2008 ; Bourg et Gouguet, 1998 et 2007 ; Gouguet, 2006) ; le dopage avec l'économie du crime (Bourg, 2011; Bourg et Gouguet, 2007) ; l'économie du sport télévisé (Gratton et Solberg, 2007 ; Jeanrenaud et Kesenne, 2006) ; le marché des droits de retransmission et le marché des émissions sportives (Bourg et Gouguet, 2007 et 2012) ; le marché de la presse sportive (Bourg et Gouguet, 1998); les déterminants économiques des performances sportives (Andreff, 2012) ; l'économie informelle du sport (Andreff, 2009 et 2012).

En ce qui concerne spécifiquement le football, il est aujourd'hui étudié par les plusieurs disciplines scientifiques (anthropologie, économie, géographie, histoire, droit, management, sociologie). La géographie ouvre de nouvelles approches et répond à des problématiques spatio-temporelles originales et innovantes (Piraudeau, 2017). Cette discipline offre des outils et des méthodes qui complètent les approches historiques, sociologiques et économiques. Elle produit également des savoirs spécifiques fondés sur l'analyse des emprises territoriales et des spatialités en construction (Augustin et al., 2014). Les migrations des élites footballistiques que l'on appelle encore la fuite des « talents sportifs » concernent les mouvements migratoires des joueurs inscrits dans le cadre de recrutements opérés par les clubs. La compétition pour obtenir les meilleurs joueurs au sein des championnats plus ou moins renommés entraîne des migrations internationales (Piraudeau, 2017).

Les migrations des footballeurs commencent à être abordées au début des années 1980. Les publications scientifiques sur ce domaine ont considérablement augmenté au début des années 2000. La migration de la main-d'œuvre sportive professionnelle au niveau international, tant dans le football que dans d'autres sports, est examinée par

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Maguire (1994, 2004), Maguire et Stead (1998), Maguire et Pearton (2000), McGovern (2002), Poli (2006, 2009) et Taylor et McGovern (2006). Ainsi, plusieurs résultats ont été obtenus. Les transactions des clubs de football sur le marché des transferts sont fortement influencées par les liens culturels et sociaux et par les relations historiques et économiques établies. Selon McGovern (2002), par exemple, les schémas migratoires sont véhiculés par les structures sociales d'une manière qui ne peut pas être expliquée par une approche purement marchande. Taylor et McGovern (2006) ajoutent qu'il est difficile de nier que les racines historiques et culturelles si souvent évoquées mais rarement examinées en détail continuent de sous-tendre de nombreux systèmes et réseaux contemporains de migration des joueurs de football. En effet, il reste clair que l'endroit où ces joueurs choisissent d'aller et où les clubs décident de rechercher des joueurs n'est pas aveugle, mais souvent déterminé par des liens coloniaux, culturels, linguistiques, sociaux et personnels établis.

Maguire (2004) et Maguire et Stead (1998) reconnaissent également l'importance des influences sociales, historiques et culturelles, mais mettent l'accent sur les facteurs économiques. Les schémas de migration des sportifs professionnels à travers les frontières nationales reflètent les influences suivantes : le degré de proximité géographique entre les pays et la facilité de déplacement ; l'impact résiduel des liens historiques impériaux ou coloniaux ; les attitudes des pays envers leurs propres ressortissants à la recherche d'opportunités d'emploi à l'étranger ; le traitement par les pays des ressortissants étrangers à la recherche d'opportunités d'emploi à l'intérieur de leurs propres frontières ; les différentiels de salaire, offrant aux joueurs la possibilité d'augmenter leurs revenus en jouant à l'étranger, ou aux clubs la possibilité de recruter des joueurs talentueux plus facilement ou à moindre coût que ce qui est possible sur le marché des transferts nationaux ; la réputation, le statut et les caractéristiques du sport dans différents pays ; la mesure dans laquelle l'exposition médiatique suscite l'intérêt et la sensibilisation pour le sport dans tous les pays ; les liens interpersonnels, qui peuvent inciter des joueurs d'une même nation à jouer dans le même pays étranger ou à rejoindre le même club simultanément.

Concernant le continent africain, les joueurs originaires du continent contribuent depuis longtemps au rayonnement des équipes régionales ou nationales des autres continents. La multiplication des opportunités pour les joueurs africains de vivre de leurs talents dans les autres régions est redevable de la libéralisation qui a touché le sport et les inégalités sociales structurant le football marchand, qui en ont été largement amplifiées (Lafabrègue, Tabé et Helleu, 2013). Au premier rang figurent celles qui résultent des rapports de domination, caractéristiques de l'économie capitaliste, théorisée par Wallerstein (2009) dans le sillage de Braudel (1985). Cette théorie met l'accent sur l'hégémonie qu'exercent les pays du centre sur les régions périphériques, qui se voient assignées la tâche de satisfaire les besoins économiques des premiers à des conditions très défavorables, tant pour les entrepreneurs que pour les travailleurs. Ces rapports n'épargnent pas le marché du sport. S'agissant du football, la majeure partie des recettes est drainée par cinq championnats situés en Europe de l'Ouest (Bourg et Gouguet, 2007), bien que des marchés secondaires aient émergé dans d'autres parties du monde ces dernières années (Japon, Amérique du Nord, Émirats du golfe Persique, Russie). En revanche, le football africain a un poids économique négligeable. En 2009, il représentait moins de 0,5 % des recettes mondiales. Toutefois, l'Afrique ne forme pas un espace homogène de ce point de vue (Lanfranchi et Taylor, 2001). Une poignée de clubs au Maghreb, en Égypte et en Afrique du Sud sont suffisamment riches pour exercer une attraction sur tout le continent. La quinzaine des autres pays africains qui composent la bande la plus périphérique du football marchand, fournissant en abondance l'Europe en main-d'œuvre à bas coût (Poli, 2009).

Les migrations des jeunes joueurs africains à destination des clubs étrangers se traduisent par des réussites, mais aussi par des échecs. Les jeunes migrants africains qui réussissent au plus haut niveau intègrent souvent, sans le savoir, le processus productif international des footballeurs professionnels. Des circuits migratoires de jeunes (joueurs) africains se développent ainsi à destination des autres régions (Tarrius, 1992). Des espaces de production, en passant par des espaces de rebond, des espaces de formation et de révélation aux espaces de consommation-confirmation, on découvre des trajectoires migratoires diverses et variées. Dès lors, notre question recherche suivante mérite d'être posée : *dans quelle mesure la migration des footballeurs d'origine africaine contribue-t-elle à rehausser le niveau de jeu en Europe ?*

## II. Méthodologie

Pour mener à bien notre étude, la méthode hypothético-déductive nous semble la mieux appropriée pour apporter les réponses à notre question principale. Cette méthode consiste à construire des réponses au phénomène étudié sur la base de la littérature théorique ou empirique. Cette méthode a été complétée par la présentation de quelques statistiques obtenues après exploitation du site de la FIFA (Federation Internationale de Football Association), d'UEFA (Union of European Football Associations) et du CIES (Centre International d'Etude du Sport).

## III. Résultats

Le recrutement des joueurs étrangers susceptible influencé par le niveau du football. Cette

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relation dépend du continent d'origine de ces joueurs. C'est à partir des années 80, que des joueurs africains ont commencé à émerger. Il s'agit des joueurs comme Jean Tigana du Mali, José Touré du Mali, Basile Boli de la Côte d'Ivoire, Gérald Passi du Congo. Puis ce furent les années 90 avec la génération des vainqueurs de la Coupe du monde et du championnat d'Europe. S'agit ici de Marcel Desailly du Ghana et de Patrick Vieira du Sénégal. En 1994, il y a eu 297 transferts (à tous les niveaux) impliquant des mouvements de pays non européens vers des pays européens. Parmi eux, 46 % venaient d'Amérique latine, 22 % d'Amérique du Nord, d'Amérique centrale et des Caraïbes, 20 % d'Asie, 7 % d'Afrique et 5 % d'Océanie.

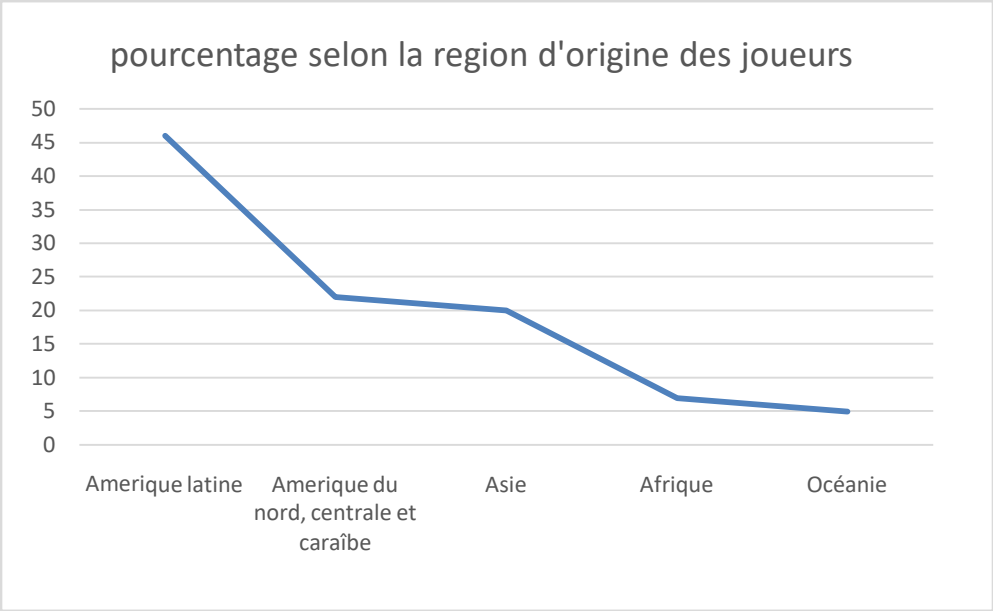


*Figure 1*

D'après une étude menée en 2004, les clubs de ligue 1 des pays de l'UEFA comptaient 647 footballeurs africains dans l'ensemble. Les nigérians étaient les plus représentés avec 105 footballeurs, suivis des camerounais (84 joueurs), des ivoiriens, des sénégalais (58 joueurs), et des ghanéens (52 joueurs).

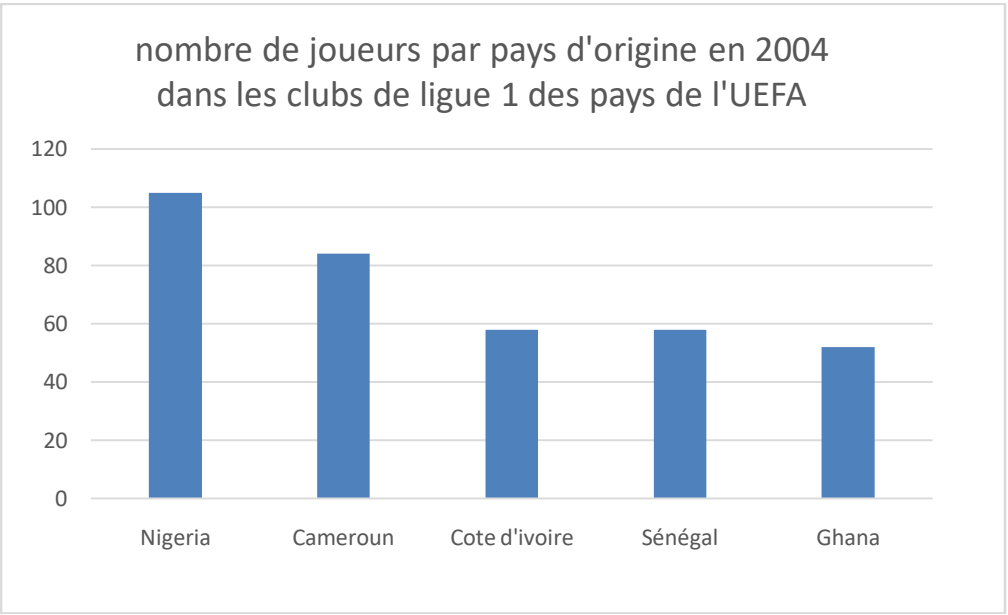


*Figure 2*

En cette période, le pays qui accueillait le plus de footballeurs du continent était la France (avec 130 joueurs), suivis de la Belgique (80 joueurs), de l'Angleterre (37 joueurs), de la Turquie (35 joueurs) et des Pays-Bas (31 joueurs). Aujourd'hui, ils sont probablement bien plus nombreux.



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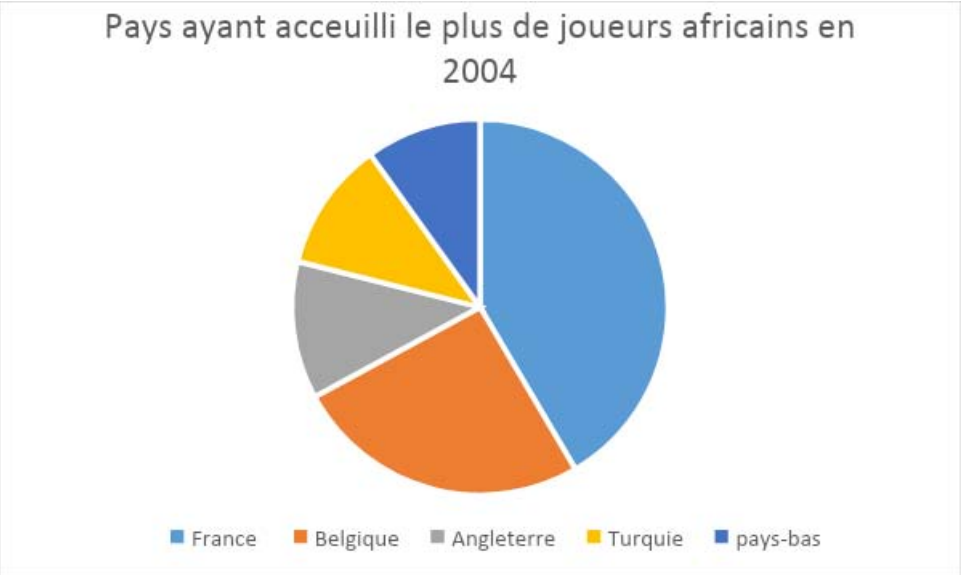


*Figure 3*

Poli (2006) examine l'origine géographique des footballeurs migrants vers les ligues sous la juridiction de l'UEFA en utilisant les données de la saison 2003. L'Europe de l'Est était le plus grand pourvoyeur de footballeurs migrants (29,7 %), suivie de l'Europe de l'Ouest (28,7 %), de l'Afrique (19,6 %) et de l'Amérique latine (16,9 %). Le plus grand pays exportateur était le Brésil (9,5 pour cent de tous les migrants dans les pays de l'UEFA). Après le Brésil, d'autres pays exportateurs importants étaient la Serbie-Monténégro, la France, l'Argentine, le Nigeria, l'Ukraine, la Croatie et le Cameroun. Le plus grand importateur de footballeurs migrants était l'Angleterre : 718 migrants (13,5% de tous les migrants dans les pays de l'UEFA) jouaient pour des clubs anglais. Après l'Angleterre, d'autres pays importateurs importants étaient l'Allemagne, l'Italie, le Portugal, la Belgique, la France et l'Espagne.

En 2008/2009 il y a également eu une diversité de joueurs en Europe. Le tableau ci-dessous fait une répartition spatiale des joueurs expatriés par zone d'origine et par pays de travail lors de la saison 2008/2009.

*Table 1*

| | Royaume uni | Espagne | France | Allemagne | Italie | Total |
|---|---|---|---|---|---|---|
| Latino-américains | 15,6 | 28,7 | 37,4 | 12,5 | 5,8 | 100,0 |
| Africains | 9,0 | 11,5 | 3,4 | 57,2 | 18,9 | 100,0 |
| Est-européens | 42,8 | 15,5 | 8,1 | 14,1 | 19,5 | 100,0 |
| Ouest-européens | 18,9 | 9,2 | 12,3 | 8,5 | 51,1 | 100,0 |
| Moyenne | 19,1 | 16,1 | 17,1 | 19,2 | 28,5 | 100,0 |

Concernant par exemple la France, une bonne partie de ces joueurs africains est installée depuis très longtemps dans ce pays. Lors de l'Euro 2008, l'équipe de France comptait dans ses rangs plusieurs joueurs d'origine africaine : patrick Vieira et Patrice Latyr Evra du Sénégal, Samir Nasri et Karim Benzéma de l'Algérie, Claude Makélélé du Congo, Lassana Diarra du Mali, Sydney Govou du Benin, Bafetimbi Gomis de la Guinée. Dans ce pays, ce sont les Sénégalais, Ivoiriens, Maliens et Camerounais qui ont les faveurs des clubs de Ligue 1. À eux quatre, ces communautés comptent plus de représentants que la totalité des autres pays du continent africain. Darby et Solberg (2010) et Poli (2010) montrent que pour la France, les deux principales sources étaient l'Afrique (48,3 %) et l'Amérique latine (23,3 %). Pour l'Angleterre, les deux principales sources étaient l'Europe occidentale (63,6 %) et l'Afrique (10,7 %).

Encore aujourd'hui, la trajectoire des footballeurs africains ne cesse d'impressionner la scène européenne. Par exemple dans les cages du FC Séville depuis l'été 2019, Yassine Bounou le portier marocain est devenu le gardien le plus décisif en Liga cette saison, aux côtés de Jan Oblak (Atlético Madrid). Le Lion de l'Atlas, formé au Wydad Casablanca, compte le meilleur pourcentage d'arrêts du championnat espagnol et s'est positionné en moins d'un an comme l'un des meilleurs gardiens de but d'Europe. Un autre portier africain a lui aussi su mettre tous les observateurs d'accord. Édouard Mendy (senégalais) s'est imposé en Angleterre comme l'un des meilleurs gardiens du monde. Avec seulement deux buts encaissés lors des



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phases de poules de la Ligue des champions. Des performances qui permettent à Chelsea de s'affirmer comme la deuxième meilleure défense du championnat anglais. Concernant Riyad Mahrez, il est certainement le meilleur milieu de terrain africain du monde. Plus grand footballeur algérien de l'histoire, selon un sondage organisé par la Fédération internationale de football (Fifa). Depuis le début de saison 2020-2021, Riyad Mahrez n'est plus un titulaire indiscutable dans l'effectif de Pep Guardiola. Un auteur joueur, vainqueur de la Ligue des champions (2019), de la Supercoupe de l'UEFA (2019) et de la Coupe du monde des clubs (2019), Sadio Mané est devenu en 2020 le premier Sénégalais a être sacré champion d'Angleterre.

Pour terminer, nous pouvons dire depuis les années 1980 jusqu'à nos jours, plusieurs africains ont contribué à rehausser le niveau de football en Europe. Par exemple, plusieurs joueurs africains ont inscrit les buts (tirs au but exclus) lors de la finale de la plus prestigieuse des compétitions de clubs en Europe. Il s'agit de l'algérien Rabah Madjer (1986/87), du camerounais Samuel Eto'o (2005/06; 2008/09), de l'ivoirien Didier Drogba (2011/12), du sénégalais Sadio Mané (2017/18), de l'égyptien Mohamed Salah (2018/19). Au moins quinze africains ont été vainqueurs d'une finale de de C1. Il s'agit du zimbabwéen Bruce Grobbelaar (1983/84), de l'algérien Rabah Madjer (1986/87), du ghanéen Abedi Pelé (1992/93), du nigérian Finidi George (1994/95), du nigérian Nwankwo Kanu (1994/95), du ghanéen Samuel Kuffour (2000/01), du sud-africain Benni McCarthy (2003/04), du malien Djimi Traoré (2004/05), du camerounais Samuel Eto'o (2005/06, 2008/09, 2009/10), de l'ivoirien Yaya Touré (2008/09), du malien Seydou Keita (2008/09, 2010/11), du ghanéen Sulley Muntari (2009/10), du nigérian Jon Obi Mikel (2011/12), de l'ivoirien Salomon Kalou (2011/12), de l'ivoirien Didier Drogba (2011/12).

## IV. Conclusion

L'objectif de cette étude était de mettre en évidence la contribution des footballeurs d'origine africaine dans le niveau de jeu en Europe. La théorie de l'économie capitaliste de Wallerstein (2009) et Braudel (1985) a été convoquée par les auteurs antérieurs. Notre étude utilise également cette théorie comme soubassement. Nous avons également fait recours à la méthode hypothético-déductive qui consiste à construire des réponses au phénomène étudié sur la base de la littérature théorique ou empirique. Cette méthode a été complétée par la présentation de quelques statistiques obtenues après exploitation du site de la FIFA (Federation Internationale de Football Association), d'UEFA (Union of European Football Associations) et du CIES (Centre International d'Etude du Sport). Il a été constaté que depuis les années 1980 jusqu'à nos jours, plusieurs joueurs africains ont contribué à rehausser le niveau de football en Europe. En effet, plusieurs joueurs africains ont inscrits les buts (tirs au but exclus) lors de la finale de la plus prestigieuse des compétitions de clubs en Europe. Egalement, au moins quinze africains ont été vainqueurs d'une finale de C1.

## Références Bibliographiques


1. Andreff, W. (2009) 'Équilibre Compétitif et Contrainte Budgétaire Dans Une Ligue de Sport Professionnel', *Revue économique*, *60,* 591–633.
2. Andreff, W. (2010) *Économie Internationale Du Sport*.
3. Andreff, W. (2012) *Mondialisation Économique Du Sport*, De boeck Louvain-la-Neuve, Belgium.
4. Andreff, W. (2012) 'The Winner's Curse: Why Is the Cost of Mega Sporting Events so Often Underestimated?' In *International handbook on the economics of mega sporting events*, Edward Elgar Publishing.
5. Augustin, J.-P. and Fuchs, J. (2014) 'Le Sport, Un Marqueur Majeur de La Jeunesse', *Agora débats/ jeunesses*, 61–70.
6. Bourg, E. F., Bent, R. J., McHolland, J. and Stricker, G. (1989) 'Standards and Evaluation in the Education and Training of Professional Psychologists: The National Council of Schools of Professional Psychology Mission Bay Conference.', *American Psychologist*, *44,* 66.
7. Bourg, G. (2011) *L'apport de La Communication Engageante et Des Représentations Sociales Dans Le Cadre de La Promotion de l'éco-Mobilité*, PhD Thesis, Université de Bourgogne.
8. Bourg, J. F. (1998) 'Dualisme et Rapport Salarial Dans Le Sport Professionnel', *J.-F. Bourg & J.-J. Gouguet. Analyse économique du sport*, 119–178.
9. Bourg, J.-F. (2007) 'La Télévision Fait Le Sport: L'équité à l'épreuve Du Marché', *Finance Bien Commun*, 81–89.
10. Bourg, J.-F. (2008) 'Les Très Hauts Revenus Des Superstars Du Sport. Un État Des Approches Théoriques et Empiriques', *Revue d'économie politique*, *118,* 375–394.
11. Bourg, J.-F. and Gouguet, J.-J. (1998) *Analyse Économique Du Sport*, Presses Universitaires de France-PUF.
12. Bourg, J.-F. and Gouguet, J.-J. (2007) *Économie Politique Du Sport Professionnel: L'éthique à l'épreuve Du Marché*, Vuibert.
13. Braudel, F. (1985) *La Méditerranée: L'espace et l'histoire*, Flammarion, 1.
14. Darby, P. and Solberg, E. (2010) 'Differing Trajectories: Football Development and Patterns of Player Migration in South Africa and Ghana', *Soccer & Society*, *11,* 118–130.




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15. Gouguet, J. (2006) 'Adverbials and Mandarin Argument Structure', *Empirical Issues in Syntax and Semantics*, *6,* 155–173.
16. Gratton, C. and Solberg, H. A. (2007) 'The Economics of Professional Sport and the Media'.
17. Jeanrenaud, C. and Késenne, S. (2006) *The Economics of Sport and the Media*, Edward Elgar Publishing.
18. Lanfranchi, P. and Taylor, M. (2001) *Moving with the Ball: The Migration of Professional Footballers*, Berg.
19. Maguire, J. (1994) 'Sport, Identity Politics, and Globalization: Diminishing Contrasts and Increasing Varieties', *Sociology of sport journal*, *11,* 398–427.
20. Maguire, J. (2004) 'Sport Labor Migration Research Revisited', *Journal of sport and social issues*, *28,* 477–482.
21. Maguire, J. and Pearton, R. (2000) 'Global Sport and the Migration Patterns of France '98 World Cup Finals Players: Some Preliminary Observations', *Soccer & Society*, *1,* 175–189.
22. Maguire, J. and Pearton, R. (2000) 'The Impact of Elite Labour Migration on the Identification, Selection and Development of European Soccer Players', *Journal of sports sciences*, *18,* 759–769.
23. Maguire, J. and Stead, D. (1998) 'Border Crossings: Soccer Labour Migration and the European Union', *International Review for the Sociology of Sport*, *33,* 59–73.
24. McGovern, P. (2002) 'Globalization or Internationalization? Foreign Footballers in the English League, 1946-95', *Sociology*, *36,* 23–42.
25. Piraudeau, B. (2017) 'Les Migrations Internationales Des Footballeuses: Un Regard Géographique', *Staps*, 75–99.
26. Poli, R. (2006) 'Migrations and Trade of African Football Players: Historic, Geographical and Cultural Aspects', *Africa Spectrum*, 393–414.
27. Poli, R. (2009) 'Labour Market Migration to the Five Major Leagues in European Football: The Impact on National Team Sélection', *Labour Market Migration in European Football: Key Issues and Challenges*, 32–50.
28. Poli, R. (2010) 'Understanding Globalization through Football: The New International Division of Labour, Migratory Channels and Transnational Trade Circuits', *International Review for the Sociology of Sport*, *45,* 491–506.
29. Tarrius, A. (1992) 'Circulation Des Élites Professionnelles et Intégration Européenne', *Revue européenne des migrations internationales*, *8,* 27–56.
30. Taylor, T. and McGraw, P. (2006) 'Exploring Human Resource Management Practices in Nonprofit Sport Organisations', *Sport Management Review*, *9,* 229–251.
31. Wallerstein, I. (2009) 'Braudel on the Longue Durée: Problems of Conceptual Translation', *Review (Fernand Braudel Center)*, 155–170.



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# A Study on the Revenue Generation Trend of Thiruvallur and Thiruttani Taluks *(Viz., Thiruppasur, Siruvanoor, Thiruvallur and Agoor and Pattabiramapuram Villages of Thiruttani)* of Tamil Nadu+

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*Introduction-* Tamilnadu is one of the economically developed states in India, which has 32 districts, taluks in hundreds and villages in thousands. But lots of studies on Tamilnadu's regional development have found a wide disparity in economic development across the state. The North part of Tamilnadu is a comparatively backward region in general and the districts like Dharmapuri, Villupuram, Tiruvannamalai and Thiruvallur in particular. As a result, it is of special importance and essential to review the rural local bodies finances with reference to backward district in general and Thiruvellur district in particular in the wake of 73rd constitutional amendment.

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# A Study on the Revenue Generation Trend of Thiruvallur and Thiruttani Taluks *(Viz., Thiruppasur, Siruvanoor, Thiruvallur and Agoor and Pattabiramapuram Villages of Thiruttani)* of Tamil Nadu+

Sudha Kumaravelu [α] & Dr. P. Thiyagarajan [σ]

## I. Introduction

Tamilnadu is one of the economically developed states in India, which has 32 districts, taluks in hundreds and villages in thousands. But lots of studies on Tamilnadu's regional development have found a wide disparity in economic development across the state. The North part of Tamilnadu is a comparatively backward region in general and the districts like Dharmapuri, Villupuram, Tiruvannamalai and Thiruvallur in particular. As a result, it is of special importance and essential to review the rural local bodies finances with reference to backward district in general and Thiruvellur district in particular in the wake of 73rd constitutional amendment.

## II. Statement of the Problem

This research pursuit has made an attempt to study the rural local finance in Tamilnadu. For that a case study of *Thiruvallur District,* covering *Thiruttani* and *Thiruvallur* taluk, is made. Though all the village panchayats in Tamilnadu have been functioning under the same Act prevailing in the state and as the rules and regulations applicable to them are same and the legal framework within which they manage their finance is common, the structure and trends of revenue and expenditure is different from one village panchayat to another. Hence a case study of selected village panchayats in two taluks has been under-taken. The revenue and expenditure of the selected village panchayats, which come under Thiruttani and Thiruvallur taluk, for the period of Ten years, that is from *2001-2002* to *2010-2011,* have been collected. The purpose of the research pursuit is to examine the patterns, trends and composition of finances of the selected Village Panchayats situated in Thiruvallur district of Tamilnadu and it will be appropriate to know the origin and evolution of structural and functional aspects of the PRIs in Tamilnadu to provide better understanding of the existing relations between the fund flow and the functions entrusted to these bodies. This will also further provide insight into its working and performance as institutions of self-governance.

## III. Rationale of the Study

The Tamilnadu Panchayat Raj Act 1994 has given more avenues for mobilization of resources and there has been an incentive-based pattern of grants to panchayats. But, the revenues of panchayats have not radically changed for the better. This is seen from poor panchayat revenue and the limited range of service offered by panchayats. Hence there is a need to urgently assess the status of rural local bodies finances and evaluate the efforts at revenue generation and to see whether the devolution of resources suggested by the SFC would alter the course of PRIs positively, so that they can move from being merely implementing agencies of state government departments towards achieving self-sufficiency in its true sense. As far as study on village panchayats finance is concerned, most of the states of Indian Union have already studied them in-depth and there is a need for immediate study on this matter also because the village panchayats in Tamilnadu have become a nodal body in implementing lot of central and state welfare programmes and entrusted with lot of development responsibilities. The findings of the study can be utilized to suggest policy modifications with regard to financial devolution of resources to village panchayats and it would also serve as a base for further studies on panchayats system in Tamilnadu as a whole.

## IV. Research Gap

The world wide trend towards decentralization in recent year was also very much evident in India. Although sporadic greater powers to rural and urban local bodies, the impetus gathered momentum only after the 73rd and 74th constitutional amendments. Within the ambit of these amendments, different states have experimented in varied ways. The state of Tamilnadu is not an exception to this development.

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The decentralization is a complex and multi-faceted phenomenon perhaps, better known than understood. The concept of decentralization has three main dimensions they are political, administrative and fiscal. These dimensions are interconnected with another and result oriented decentralization must be attained towards these dimensions together appropriate political structures and administrative capacity at the local level must be complemented with adequate functional and financial powers and autonomy. Many studies on rural decentralization have emanated from India, but most of the studies have largely concentrated on the political and administrative dimensions, fiscal issues at the local level have received scant attention either due to lack of information/data or due to lack of emphasis. This research pursuit is an attempt to correct this anomaly. It tries to understand the fiscal management at the lowest levels of local governance, namely the village panchayats, in the state of Tamilnadu.

## V. Objectives of the Study

The purpose of the research pursuit is to examine the patterns, trends and composition of finances of the selected Village Panchayats situated in Thiruvallur district of Tamilnadu and it will be appropriate to know the origin and evolution of structural and functional aspects of the PRIs in Tamilnadu to provide better understanding of the existing relations between the fund flow and the functions entrusted to these bodies. This will also further provide an insight into its working and performance as institutions of self governance. The overall objective of the research pursuit is to examine the revenue generation and expenditure management of selected village panchayats in *Thiruvallur* district of Tamilnadu. The investigation has the following specific objectives.

1. To analyse the structure, trends and composition of revenue of selected village panchayats of Thiruvalluvar District of Tamilnadu.
2. To suggest ways for ensuring the selected village panchayats to be financially stronger entities.

## VI. Hypotheses of the Study

In order to provide sharpness to the analysis on the objective of the research problem and to fine tune the following hypotheses are evolved:

There is no significant difference between various years in respect of total tax revenue of village panchayats.

1. There is no significant difference between various years in respect of flow of funds from State Government to panchayats by way of grants in-aid.
2. There is no significant difference between various years in respect of total non-tax revenue of the village panchayats.
3. There is no significant difference between various years in respect of funds received for implementing centrally sponsored schemes by the village panchayats.

## VII. Scope of the Study

This is a case study of the revenue generation and expenditure management of the four village panchayats falling within Thiruttani and Thiruvallur taluks in Thiruvallur District of Tamilnadu. The scope of the study is limited to the revenue generation and expenditure management of selected village panchayats in Thiruvallur–district of Tamilnadu for a ten year period that is from 2001-2002 to 2010-2011. This period had witnessed steady growth in panchayat raj system in the state of Tamilnadu. An insight into that will ultimately help to understand the effectiveness and efficiency of the village panchayats in generating revenues and managing expenditures. Thus the present study adds a new dimension to the existing field of knowledge. It will be useful for academic as well as practical purposes.

## VIII. Methodology, Data base, Data Process and Presentation and Period of Study

*a) Methodology*

The present study is mainly analytical and partly descriptive. The study mainly made use of the secondary data which were collected from the selected village panchayats situated in Thiruvullur district of Tamilnadu. The analytical study is based on secondary data. Thorough review of documents pertaining to revenue generation and expenditure management of village panchayats have been attempted and extensive consultations were also had with the experts in the areas of decentralization and panchayat finance.

For the selection of samples out of 860 village panchayats situated in 11 taluks, priority is given to the village panchayats situated in hilly areas dominated by ST population and to the village panchayats situated in plain areas dominated by SC population. Thiruvallur taluk of Thiruvellur district comprise considerable village panchayats situated in hilly areas which are dominated also by ST population and therefore the selection of Thiruvallur taluk have been made first. Secondly, two village panchayats namely, Thirupassur and Siruvanoor have been randomly selected from Thiruvallur taluk. Thiruttani taluk of Thiruvellur district consists of sizeable village panchayats situated in plain regions which are dominated also by SC population and therefore Thiruttani taluk selection has been made. Two village panchayats namely Agoor and Pattabiramapuram have been randomly selected from Thiruttani.

A conspectus analysis of the revenue and expenditure of the village panchayats for ten years, i.e. from 2001-2002 to 2010-2011, is made here. Financial

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data from 2001-2002 to 2010-2011 were collected from the reports, records and budget accounts maintained by the offices of the concerned village panchayats. The ten year period is considered to be sufficient for knowing the pattern and trends of revenues and expenditures of the selected village panchayats and hence the latest ten year period for which data have been available is included.

*Table 1.1:* Sample Design of the study

| Name of the State | Name of the District Selected for the Study | Name of the Taluks Selected for the Study | Name of the Village Panchayats Selected for the Study |
|---|---|---|---|
| Tamilnadu | Thiruvallur | Thiruvallur | 1. Thirupassur<br>2. Siruvanoor |
| | | Thiruttani | 1. Agoor<br>2. Pattabiramapuram |

*b) Sample Design*

For in depth study on the analysis of rural development programmes on beneficiaries, four village Panchayats were selected purposively under two taluks of Thirvallur District. In the second stage, from each village Pancahyats 100 sample beneficiary respondents of rural development programmes were selected. The total sample respondents are 400.

*c) Data Base*

The source and methods through which data were collected are the study of relevant literature, both published and unpublished, observation, formal and informal discussion with the officials, non-officials, people's representatives and experts in the area of local finance. The reports of the various committees appointed by Tamilnadu Government in the study period i.e. 2001-02 to 2010-11 were utilized for gathering information about the structural and functional aspects of the village panchayats. The annual financial statements of village panchayats which are maintained by the concerned panchayat offices and other materials available relating to finances of village panchayats have also been collected. The socio-economic characteristics of the district as a whole and the panchayats selected for the study were also been obtained from the annual economic reviews of Government of Tamilnadu as well as from the primary census reports. All the collected information and data were rigorously cross- checked before they were utilized for the analysis.

*d) Data Processing and Presentation*

The relevant materials obtained from secondary sources were analyzed to bring out different aspects of the main theme of the study. The collected secondary data is tabulated and processed by employing suitable statistical tools such as proportions, averages, trend analysis using the method of least squares, correlation and analysis of variance (ANOVA) by making use of computer software packages namely Excel, SPSS. Graphs and diagrams were shown for greater clarity, conclusion are arrived on the basis of these analyses.

*e) Period of study*

The study relates to a period of ten years i.e. from *(2001-2002 to 2010-2011)* during which panchayat system has witnessed a steady growth in Tamilnadu despite lots of political and policy level changes. During this period, the village panchayats setup has not only continued to play an increasing role in the village level economic development but also in the basic service delivery area.

*f) Literature Review and Arriving at Research Gap*

The significance of public administration and public finance lies in the fact that it provides better services to local people according to their needs (1). In the realm of public administration there is a renewed interest in decentralisation. It is called New Development Administration. It aims at ensuring and institutionalizing people's participation through the process of decentralisation. Traditionally, the erstwhile Development Administration was understood as the management of development and administrative development. It connotes the planned institutional capacity to accomplish the specific goals of development through the formulation of appropriate policies, programmes and projects and their successful implementation. But, here popular participation is merely of asymmetric partnership with development agencies. Moreover, popular participation in Development Administration was not linked with local area politics, thus preventing allocative decision-making.

The public finance focused heavily on identifying the sources of local government revenue, assessing the equity and strength of these revenue sources, dependence of local government on central government transfers, revenue generation and financial management, and examining mechanisms to stimulate greater local resource mobilisation the public finance theoriate have not dout with the organisations or private firms ect. The public finances and public administration approach is concerned mainly with macroeconomic issues. It analyses organisational arrangements and financial instruments.

There are four major theories which advocate decentralisation for better and responsive Governance. They are a) fiscal federal b) public choice c) public administration and public finance and d) political economy. Fiscal federal approach spells out that local



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level planning system provides cost effective public services, because it considers local preferences more carefully than the central government (Oates, 2). Public choice theory is useful in analysing the benefits and costs of decentralizing the provision of delivery services. Public choice theory assumes that the voter is a customer and the politician is a businessman. Public choice school holds the view that the people are aware of their needs, and therefore people's involvement in planning and implementing will be more effective and efficient *(3).*

Hence, the theory proposes to allow them to make choices about services, taxes and other policies. Again, the problem is public choice theorist is not much concerned effective services which may not be achieved by market mechanism. Public choice approach can be useful in understanding the nature of goods and services. It analyses the cost and benefits of decentralisation. The main limitation of public choice approach is that it is too much rationalistic and suggests narrow prescriptions *(4).* Further, rational voters do not vote, and that when rational candidates compete for the votes of rational voters, there is no equilibrium outcome *(5).* This is because the behavior of people is different from one another. The prediction of rational behaviour always may not be authentic.

Political economy perspective is a greater model theory, which has, experienced that institutional and financial arrangements have an impact on the cost efficiency of efficiency of delivery of services *(6).* It includes significant factors like political, administrative, financial, social, organisational, local resources, technical assistance and so on. In decision making process political conditions (creative and systematic thinking of leaders and political stability) are considered very significant which affect the implementation of decentralised governance. Political economy implies that useful relationships among the interest groups are necessary for policy making and implementation. Even in non-democratic countries decision are made not only by rational calculation but also by political bargaining and negotiation.

It also shares revenues and public expenditure between richer areas and poorer areas. Although there has been drawback that it makes macroeconomic policies more difficult. The analysis of fiscal federalism is used only to understand the system of sharing tax revenues and the commitment of public expenditure between central and subnational government *(7).* It accommodates pressure of regional autonomy, and sustains heterogeneous society. The economic rationale for decentralised governance is to improve the 'competitiveness' of governments by satisfying the wishes of citizens and cost efficiency in delivery services *(8).* The most common political rational for decentralised governance is that it is assumed as good governance which is very much closer to the people *(9).*

It analyses the system of sharing tax revenues and public expenditure commitments between central and sub national government. Under decentralised fiscal system, the local jurisdiction collects all taxes from various local sources and according to these collections it undertakes developmental programmes for the people *(10).* Nevertheless, it is not very clear whether political economy can identify local needs and satisfy people in a society where society is based on a certain hierarchy.

Again, there is debate as to whether politics and economics will go together or economy will go simply.

All the above theories are based on macro level study. These theories have not only not explained micro phenomenon but also have not identified the causal mechanisms and processes of grassroots level in the valuable areas.

*Research Gap:*

The above are scholarly research work carried out researchers throughout the globe on the devolution and decentralization of financial powers for participation from the gross root level for effective stake holder participation in planning and economic development. These studies reviewed above throw light on decentralization of financial powers to the lower rung of the administrative system for effective people's participation. The attention paid in these studies was not micro in nature and, moreover, the studies did not consider intricate fiscal process of the village panchayat where socially and economically weaker sections are the majority habitants. Further, not much work has been done so far to analyze the various sources of funds and items of expenditure in the post 73rd amendment to the constitution and the devolution of state plan funds to the village panchayats in Tamilnadu in order to address this anomalous situation the present research work has been undertaken.

## IX. Panchayat Raj in Tamilnadu an Historical Perspective

The history of the local self-governance in Tamil Nadu can be traced back to the stone edicts and carvings in Sri Vaikunda Perumal Temple of Uthiramerur in Kancheepuram district, which bear evidence to the well established local self-governance during the period of Chola Empire. It is inscribed on the walls of the temple in granite slabs that the village had a perfect electoral system and a written constitution prescribing the mode of election. This inscription can be dated around 920 AD in the reign of Parantaka Chola, which demonstrates the perfect electoral system that existed in ancient Tamil Nadu *(11).*

It was a system of democracy in monarchy where the members of the Village Council were elected through a process of secret ballot called 'Kuda Olai Murai' and these Councils functioned as self-contained economic and administrative entities. This system of secret ballot is the forerunner for today's electoral system. A huge mud pot (Kudam) was placed at an

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important location of the village, which served as a ballot box. The voters had to write the name of the desired candidate on the palm leaf (Panai olai) and drop it in the pot. At the end of the process, the leaves were taken out of the pot and counted candidate-wise and whoever got the highest number of votes was selected as the member of the Village Council. It is also interesting to note that eligibility criteria and norms for disqualification had been prescribed for those who contested for the Village Council *(12)*.

With the advent of the British rule, the system of local self-governance slowly disintegrated and the industrialization that followed resulted in massive unemployment. This eventually shattered the basic structure of the local self- governance. However, the British presented a modified concept of local self-governance to suit the British colonial rule. The District Board Fund was conceptualized in 1854, and the Madras Local Fund Act 1871 was later enacted by Governor Mayo. Local Fund Boards were set up in their respective areas and were devolved with certain functions. Madras Local Board Act, 1884 was the outcome of the Lord Ripon's Local Self Government Resolution of 1882, which ushered in the 3 tier system of Local Boards namely District Boards, Taluk Boards and Union of Villages. In 1920, the Government enacted two legislations. (i). The Madras Local Boards Act (replacing 1884 Act) and (ii). Village Panchayat Act.

In 1930, Madras Village Panchayat Act was repealed and Village Panchayats came under the purview of Madras Local Boards Act 1920 by an amendment to the Act in 1930. Though local self-governance was accentuated in all the above proclamations, the Government continued to exercise absolute control over the Local Bodies through Inspector of Municipalities and Local Boards. In the post-independence era, the Government enacted Madras Village Panchayat Act 1950 for devolving greater powers to Panchayats. Article 40 in Part-IV of the Constitution of India provide for the organization and endowment of powers to the Panchayats. The District Boards looked after Health and Education and the Panchayats undertook various activities to fulfill the basic needs of the people. A model Panchayat Union comprising some Village Panchayats was set up in Madurai in 1951. The Government of India launched Community Development and National Extension Service Scheme in 1952 for Area Development through "Development Blocks". The Government of Madras was not in total agreement with the recommendations of Balwantrai Mehta Committee (1957) and enacted Madras Panchayats Act, 1958 and Madras District Development Council Act, 1958 *(13)*.

## X. Village Panchayats in Tamil Nadu

There are 12,620 Village Panchayats in the State spread across the 30 district and the 30 district and the 385 Block. The average number of Village Panchayat per district is 421 and per Block is 32. The Nilgiri (35), Kanniyakumari (99), Theni (130) and karur (158) are some of the districts with fewer Village Panchayat while Villupuram (1104), Tiruvananamalai (860), Vellore (753), Cuddalore (683) and Kancheepuram (648) are some of the districts with a large number of Village Panchayats. As can be seen from Figure 3.1, the population of Village Panchayats in Tamil Nadu is widely varying with some Village Panchayats having population even below 500 while others have populations exceeding 25,000. In addition to the 681 Village Panchayats in Cuddalore District, two more Village Panchayats viz. Perumathur and Indira Nagar have been newly constituted in Kurijipadi Panchayat Union and have started functioning from 18.8.2008. *(14)*

## XI. Functions, Functionaries and Funds

Tamilnadu Panchayats Act, 1994 prescribes various powers and functions to Village Panchayats and Panchayat Unions under Sections 110, 111 and 112. Pursuant to its commitment to devolve greater powers and responsibilities to PRIs and Urban Local Bodies (ULBs) and based on the announcement made in the Legislative Assembly on 11 August 2006, State Government ordered (January 2007) the constitution of the Third High Level Committee with the Minister for Rural Development as the Chairman along with select District Panchayat Chairperson, Panchayat Union Chairpersons and Village Panchayat Presidents besides certain subject experts as members. The Committee was required to study the duties, functions and powers already entrusted to the PRIs and ULBs and make recommendations for further devolution of the same in order to make them more effective.

The committee presented its report to Government in December 2007 and submitted a total of 99 recommendations, categorized under 39 subjects. Several new initiatives have been undertaken to strengthen the functioning of PRIs such as provision of separate vehicles for Panchayat Union Chairpersons. Making the implementation of Mahatma Gandhi National Rural Employment Guarantee Scheme (MNREGS) work a mandatory duty for the Village Panchayat Presidents and devolution of powers in respect of Social Welfare Education and Revenue Departments and amendments made in the Town Panchayats Act, 1994 reconstituting the appointment committee of Panchayat Union, increased devolution of SFC grant to PRIs *(15)*.

### *a) State Finance Commission (SFC)*

As per the provisions of the 73rd Constitutional Amendment, Tamil Nadu was one of the first State to establish the State Commission vide G.O.Ms.No.350 Finance Department dated 23.04.1994. So far, three SFC have been constituted for devolution of funds to the



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Local Bodies. The first State Finance Commission was constituted for the period from 1997-1998 to 2001-2002. The second State Finance Commission was constituted for the period from 2002-2003 to 2006-2007. The third State Finance Commission was commissioned for the period from 2007-2008 to 2011-2012. The Government have, vide G.O.Ms.No.549, Finance (Finance Commission-IV) Department, dated 01.12.2009, constituted Forth State Finance Commission to review the financial position of the rural and urban local bodies namely Village Panchayats, Panchayat Union Councils, District Panchayats, Town Panchayats, Municipalities Corporations (16).

*b) Analysis of the Data Collected of the Four Villages*

i. *Profile of the Thirupassur Village Panchayats*

*Table 2:* Geographical Area of the selected four villages

| | Thirupassur | Siruvanoor | Agoor | Pattabiramapuram |
|---|---|---|---|---|
| Area | 6.21 Sq.kms | 6.82 Sq.kms | 5.38 Sq.kms | 4.12 Sq.kms |
| Block | Thiruvallur | Thiruvallur | Tiruvalangadu | Tiruvalangadu |
| Taluk | Thiruvallur | Thiruvallur | Tiruttani | Tiruttani |
| Total Household | 486 | 1689 | 1116 | 580 |
| Total Population | 1983 | 7157 | 4366 | 2303 |
| Child Population (0-6) | 225 | 836 | 559 | 281 |
| Literacy Rate | 66.78 | 69.48 | 58.41 | 59.97 |
| Sex Ratio | 1013 | 1002 | 1019 | 1027 |
| Work Force ( Main and Marginal) | 793 and 184 | 2842 and 795 | 1930 and 527 | 950 and 288 |

*c) Analyais on Tax Revenue*

Mobilization of resources at the local level is very important in the context of decentralisation. Tax constitutes an important source of revenue at the local level. The following table shows the amount of direct taxes collected by four village panchatyats over the ten year period.

*Table 3:* Tax Revenue and its Average of the four villages

| Year | Thirup-pasur | Siruvanoor | Agoor | Pattabira-mapuram | Average in Rs.) |
|---|---|---|---|---|---|
| 2001-02 | 35907 | 11754 | 21918 | 11068 | 20161.75 |
| 2002-03 | 59674 | 12421 | 23075 | 12187 | 26839.25 |
| 2003-04 | 47514 | 22938 | 13741 | 12310 | 24125.75 |
| 2004-05 | 58423 | 35539 | 29285 | 13589 | 34209.00 |
| 2005-06 | 44216 | 53515 | 23382 | 20084 | 35299.25 |
| 2006-07 | 40443 | 51951 | 24025 | 15923 | 33085.5 |
| 2007-08 | 78189 | 46183 | 42334 | 19975 | 46670.25 |
| 2008-09 | 42432 | 59970 | 21028 | 21820 | 36312.50 |
| 2009-10 | 56457 | 44645 | 40103 | 32351 | 43389.00 |
| 2010-11 | 80728 | 65550 | 55936 | 32483 | 58674.25 |

*Source: Data compiled from the Annual budget reports of the village panchayat.*

The average tax revenue received by the four village panchayats has increased from Rs. 20,161.75 in 2001-02 to Rs. 58,674.25 in 2010-11*(Table 3.)*. The average tax revenue which was Rs. 26,839.25 in 2002-03 declined to Rs. 24,125.75 in 2003-04 after registering an increase to Rs. 34,209.00 in 2004-05. On an average, this item of revenue shows a sharp increase over the previous year except during 2003-04, 2006-07 and 2008-09. From the inter-panchayat analysis of direct taxes, it is found that Thiruppasur village panchayat received the highest revenue (i.e., Rs. 80,728) from this source in 2010-11 and Pattabiramapuram village panchayat received the lowest revenue (i.e., Rs. 11,068) in 2001-02.

*Table 4:* Trend of Tax Revenue

| Year | Actual | Trend |
|---|---|---|
| 2001-2002 | 20161.750 | 20643.07273 |
| 2002-2003 | 26839.250 | 24028.31212 |
| 2003-2004 | 24125.750 | 27413.55152 |
| 2004-2005 | 34209.000 | 30798.79091 |
| 2005-2006 | 35299.250 | 34184.03030 |



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| | | |
|---|---|---|
| 2006-2007 | 33085.500 | 37569.26970 |
| 2007-2008 | 46670.250 | 40954.50909 |
| 2008-2009 | 36312.500 | 44339.74848 |
| 2009-2010 | 43389.000 | 47724.98788 |
| 2010-2011 | 58674.250 | 51110.22727 |

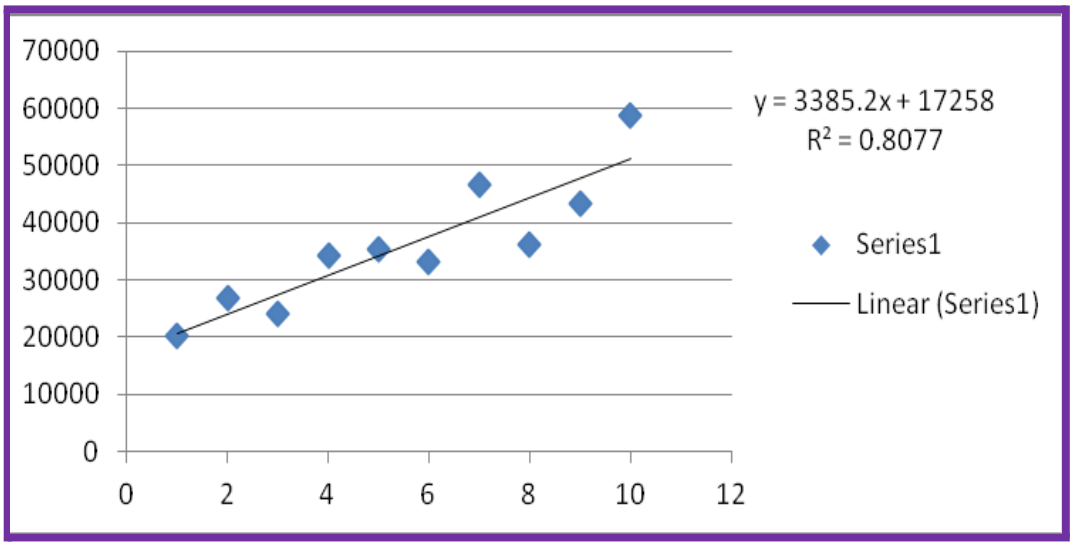


*Figure 2:* Trend of Tax Revenue

Figure 5.1 indicates that there exists an increasing trend in the case of average tax revenue of all the four village panchayats. The trend value for the year 2001-02 is 20643.07 and the same for the year 2010-11 is 51110.22 *(Table-4).*

*d) Non-Tax Revenue*

Non-tax revenue consists of license fees, registration fee, service/user charges, income from property, and income from property other than rent, permit fees, fines and penalties. It constitutes a very small portion of the total revenue of panchayats.

*Table 5:* Non-Tax Revenue and its Average

*(in Rs.)*

| Year | Thirup-pasur | Siruvanoor | Agoor | Pattabira-mapuram | Average |
|---|---|---|---|---|---|
| 2001-2002 | 5742.00 | 3526.00 | 4736.00 | 3352.00 | 4339.00 |
| 2002-2003 | 3096.00 | 5382.00 | 8136.00 | 3800.00 | 5103.50 |
| 2003-2004 | 3956.85 | 6179.00 | 8130.00 | 2548.00 | 5203.46 |
| 2004-2005 | 4498.56 | 8759.51 | 7637.00 | 1381.00 | 5569.02 |
| 2005-2006 | 6073.00 | 9207.13 | 9414.00 | 2540.00 | 6808.53 |
| 2006-2007 | 7243.49 | 10440.21 | 11007.00 | 3670.00 | 8090.18 |
| 2007-2008 | 9254.00 | 11048.00 | 13349.00 | 2270.00 | 8980.25 |
| 2008-2009 | 11621.00 | 13929.00 | 17426.00 | 6522.00 | 12374.50 |
| 2009-2010 | 14048.00 | 16217.00 | 19783.00 | 9117.00 | 14791.25 |
| 2010-2011 | 18493.00 | 21772.00 | 20112.00 | 10479.00 | 17714.00 |

*Source: Data compiled and computed from the Annual budget reports of the village panchayats.*

The average non-tax revenue received by the four village panchayats increased from Rs.4,339 in 2001-02 to Rs. 17,714 in 2010-11 *(Table 5).* The average non-tax revenue which was Rs. 4,339 in 2001-02 gradually increased to Rs. 6,808.53 in 2005-06 and to Rs. 17,714 in 2010-11. The table also reveals that among the four village panchayats, Siruvanoor village panchayat received the highest revenue (i.e., Rs. 21,772) and Puliyar village panchayat received the lowest revenue (i.e., Rs. 10479) from this source in 2010-11.



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*Table 6:* Trend of Non-Tax Revenue

*(in Rs.)*

| Year | Actual | Trend |
|---|---|---|
| 2001-2002 | 4339.00 | 2473.01 |
| 2002-2003 | 5103.50 | 3900.64 |
| 2003-2004 | 5203.46 | 5328.28 |
| 2004-2005 | 5569.01 | 6755.91 |
| 2005-2006 | 6808.53 | 8183.55 |
| 2006-2007 | 8090.18 | 9611.18 |
| 2007-2008 | 8980.25 | 11038.82 |
| 2008-2009 | 12374.50 | 12466.45 |
| 2009-2010 | 14791.25 | 13894.09 |
| 2010-2011 | 17714.00 | 15321.72 |

*(in Rs.)*

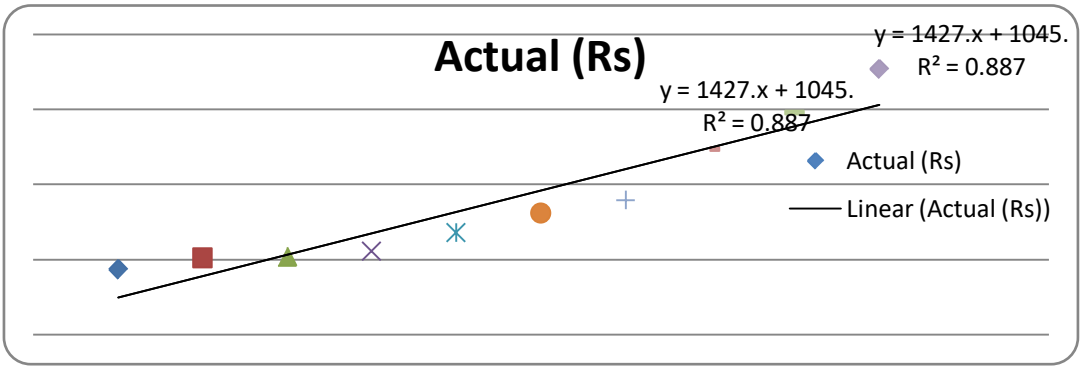


*Figure 3:* Trend of Non-Tax Revenue

Table 6 indicates that the trend value for the year 2001-02 is 2473.01 and 15321.72 in 2010-11. The Figure 3 indicates that there exists an increasing trend in case of average non-tax revenue.

*e) Grant-In-Aid*

Grant-in-aid includes both plan fund and non-plan fund received from the State Government by the village pachayats.

*Table 7:* Grant-in-Aid and its Average

*(in Rs.)*

| Year | Thirup-pasur | Siruvanoor | Agoor | Pattabira-mapuram | Average |
|---|---|---|---|---|---|
| 2001-2002 | 49422.00 | 58435.00 | 74281.00 | 144960.00 | 81774.50 |
| 2002-2003 | 60120.00 | 59985.00 | 121224.00 | 174161.00 | 103872.50 |
| 2003-2004 | 65450.00 | 67932.00 | 209462.00 | 176280.00 | 129781.00 |
| 2004-2005 | 155217.00 | 64589.00 | 241793.00 | 198830.00 | 165107.25 |
| 2005-2006 | 181021.00 | 80742.00 | 229692.00 | 199860.00 | 172828.75 |
| 2006-2007 | 293137.00 | 119497.00 | 258405.00 | 213910.00 | 221237.25 |
| 2007-2008 | 240420.00 | 105022.00 | 269542.00 | 239135.00 | 213529.75 |

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| | | | | | |
|---|---|---|---|---|---|
| 2008-2009 | 312500.00 | 193665.00 | 388763.00 | 227910.00 | 280709.50 |
| 2009-2010 | 328792.00 | 240497.00 | 409752.00 | 333593.00 | 328158.50 |
| 2010-2011 | 488634.00 | 365454.00 | 555841.00 | 416876.00 | 456701.25 |

*Source: Data compiled and computed from Annual budget reports of the village panchayats.*

There is much variation in the grant-in-aid received by the village panchayats from year to year. It could be noted from the *Table-7* that there has been substantial increase in the amount of grant-in-aid received by Agoor village panchayat from the year 2002-03, Thiruppasur village panchayat from the year 2004-05 and Siruvanoor village panchayat from the year 2006-07.

Analysing the average grant-in-aid received by all the four village panchayats over the period of study, it was observed that there was a sharp increase in the grant-in-aid from Rs. 2,13,529.75 in 2007-08 to Rs. 2,80,709.50 in 2008-09. In 2009-10, the funds devolved to four village panchayats averaged to Rs. 3,28,158.50 and in 2010-11, it averaged to Rs. 4,56,701.25. However, in 2007-08 a slight decrease in the average grant-in-aid was recorded. The year wise and village panchayat wise analysis shows that Agoor Panchayat received the highest annual amount of grant-in-aid of Rs. 5,55,841 in 2010-11, followed by Thiruppasur village panchayat (Rs. 4,88,634) during the same year.

The consistent and substantial increase of grant-in-aid received by all the four village panchayats clearly indicates the state governments' interest and commitment towards strengthening developmental activities in the backward villages.

*Table 8:* Trend of Grant-in-Aid

*(in Rs.)*

| Year | Actual | Trend |
|---|---|---|
| 2001-2002 | 81774.50 | 54661.08 |
| 2002-2003 | 103872.50 | 90374.18 |
| 2003-2004 | 129781.00 | 126087.27 |
| 2004-2005 | 165107.25 | 161800.37 |
| 2005-2006 | 172828.75 | 197513.47 |
| 2006-2007 | 221237.25 | 233226.57 |
| 2007-2008 | 213529.75 | 268939.67 |
| 2008-2009 | 280709.50 | 304652.77 |
| 2009-2010 | 328158.50 | 340365.86 |
| 2010-2011 | 456701.25 | 376078.96 |

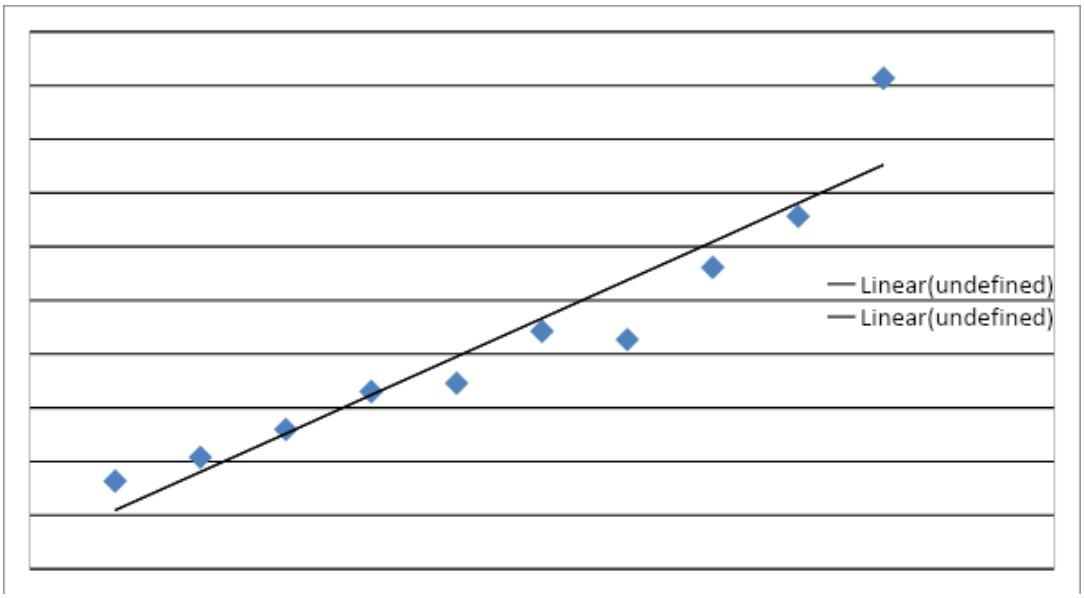


*Figure 4:* Trend of Grant-in-Aid



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The average grant-in-aid received by the four village panchayats shows an increasing trend over the period of study *(Figure 4)*. The trend value was 54661.08 in 2001-02 and 376078.96 in 2010-11 *(Table 8)*.

*f) Fund for Central Government Sponsored Schemes*

Village panchayats have been receiving funds for the implementation of certain schemes of Central Government.

*Table 9:* Fund for Central Government Sponsored Schemes and it's Average

(in Rs.)

| Year | Thirup-pasur | Siruvanoor | Agoor | Pattabira-mapuram | Average |
|---|---|---|---|---|---|
| 2001-02 | NA | 936052.00 | 382092.00 | 527924.00 | 615356.00 |
| 2002-03 | NA | 1241579.00 | 571204.00 | 710562.00 | 841115.00 |
| 2003-04 | NA | NA | 483063.00 | 809251.00 | 646157.00 |
| 2004-05 | NA | NA | 680173.00 | 454150.00 | 567161.50 |
| 2005-06 | NA | NA | 535911.00 | 525110.00 | 530510.50 |
| 2006-07 | 831683.00 | NA | 789523.00 | 601750.00 | 740985.33 |
| 2007-08 | 891312.00 | 1240267.00 | 859364.00 | 850347.00 | 960322.50 |
| 2008-09 | 1143181.00 | NA | 1052044.00 | 922348.00 | 1039191.00 |
| 2009-10 | 1730461.00 | 1164869.00 | 1243052.00 | 893514.00 | 1257974.00 |
| 2010-11 | 1239714.00 | 1729104.00 | 1320200.00 | 850141.00 | 1284789.80 |

*Source: Data compiled and calculated from the Annual budget reports of the village panchayats. (NA: Not Available)*

The average fund for the central government sponsored schemes does not show a clear pattern of change over the period. In some years it increased while in other years it decreased. The fund which was Rs. 6,15,356 in 2001-02 increased to Rs. 8,41,115 in 2002-03 and deeply declined to Rs. 6,46,157 in 2003-04 and to Rs. 5,30,510 in 2005-06. However, from 2006-07 onwards, the fund moves in the upward direction and reaches at Rs. 12,84,789 in 2010-11 *(Table 9)*. Among the four village panchayats, Agoor village panchayat received the highest fund revenue.

In the case of Thiruppasur village panchayat, the fund for central government sponsored scheme was not allotted for the first five years that is from 2001-02 to 2005-06. Similarly, in Siruvanoor village panchayat also, from 2003-04 to 2006-07, that is for four years, and in 2008-09, fund for central government sponsored scheme was not allotted. The administrative and procedural delays on the part of respective village panchayats only led to this financially and development wise uncomfortable position. The funds allotted for the implementation of central government sponsored schemes are the major source of revenue through which the development activities can be activated at the village level and the benefits could have been catered down to the needy section. This is miserably missed by the above mentioned village panchayats.

*Table 10:* Trend of Central Government Sponsored Schemes Fund

(in Rs.)

| Year | Actual | Trend |
|---|---|---|
| 2001-02 | 615356.00 | 512955.04 |
| 2002-03 | 841115.00 | 587488.64 |
| 2003-04 | 646157.00 | 662022.24 |
| 2004-05 | 567161.50 | 736555.85 |
| 2005-06 | 530510.50 | 811089.45 |
| 2006-07 | 740985.33 | 885623.06 |
| 2007-08 | 960322.50 | 960156.66 |
| 2008-09 | 1039191.00 | 1034690.26 |
| 2009-10 | 1257974.00 | 1109223.87 |
| 2010-11 | 1284789.75 | 1183757.47 |



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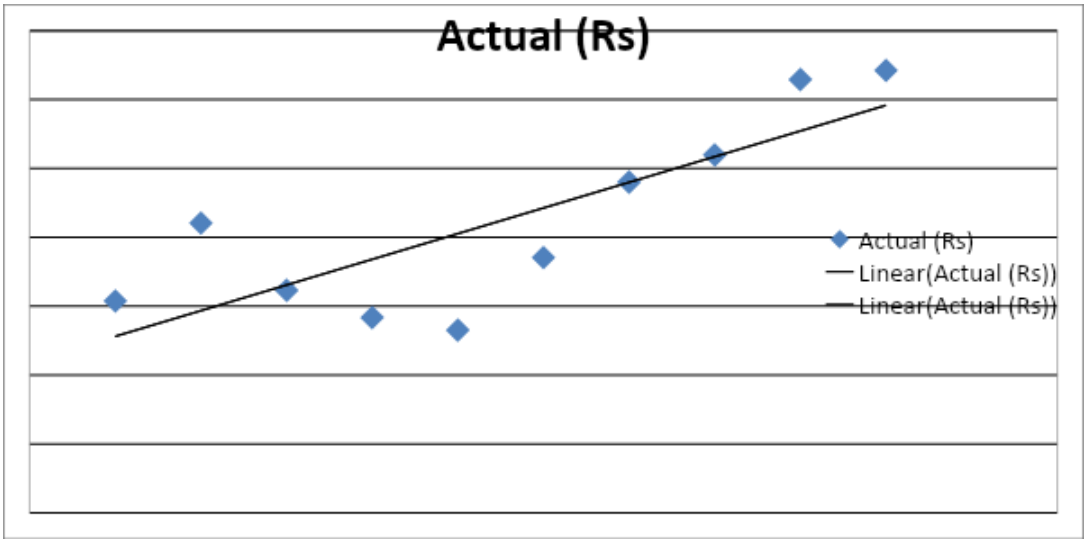


*Figure 5:* Trend of Central Government Sponsored Schemes Fund

Table 10 reveals that there exists an increasing trend with regard to average fund revenue over the ten year period. The trend values are 512955.04 in 2001-02 and 1183757.47 in 2010-11.

## XII. Hypothesis Results and Discussion

Keeping in mind the objectives of the study, the researcher framed null hypotheses. Proposed hypotheses are the depicted explanation for the certain phenomena which might occur or vise versa under defined situation. The decisions are here made on the basis of data collected from controlled or observed method. On the basis of results discussed above, the outcome of the test would result either rejection or acceptance of null-hypothesis for a pre-specified level of significance. Statistical data therefore is based upon assumptions which state that "if null hypothesis is true, what will be the probability (p value) of observing the value for test statistics which is extreme as the actual observed value". The explanation for proposed hypothesis related to revenue aspects of village pachayats with respect to their acceptance or rejection.

*Null Hypothesis: 1*

*Table 11:* There is no significant difference between various years in respect of total tax revenue of village panchayats

| Place | ANOVA | | | | | |
|---|---|---|---|---|---|---|
| | | Sum of Squares | df | Mean Square | F | Sig. |
| Thiruppasur | Regression | 30690160740.782 | 1 | 30690160740.782 | 26.491 | 0.001** |
| | Residual | 10426633392.218 | 9 | 1158514821.358 | | |
| | Total | 41116794133.000 | 10 | | | |
| Siruvanoor | Regression | 8389357608.439 | 1 | 8389357608.439 | 47.236 | 0.000** |
| | Residual | 1598443053.561 | 9 | 177604783.729 | | |
| | Total | 9987800662.000 | 10 | | | |
| Agoor | Regression | 19676299936.623 | 1 | 19676299936.623 | 13.982 | 0.005** |
| | Residual | 12665610312.377 | 9 | 1407290034.709 | | |
| | Total | 32341910249.000 | 10 | | | |
| Pattabiramapuram | Regression | 5484112632.727 | 1 | 5484112632.727 | 25.136 | 0.001** |
| | Residual | 1963582481.273 | 9 | 218175831.253 | | |
| | Total | 7447695114.000 | 10 | | | |

*** represents significant at 1% level source: computed Data*

The table 11 illustrates the results of ANOVA test conducted to establish the hypothesis that there is no significant difference between various years in respect of total tax revenue of Thiruppasur, Siruvanoor, Agoor and Pattabiramapuram Village Panchayats in the reference period. All the panchayats p value is less than 0.01. Therefore the null hypothesis is rejected at 1% level of significance. *It is concluded that there is significant difference between various years in respect of total tax revenue of Thiruppasur, Siruvanoor, Agoor and Pattabiramapuram Village Panchayats from the year 2001-02 to 2010-11.*



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*Null Hypothesis: 2*

*Table 12:* There is no significant difference between various years in respect of flow of funds from State Government to panchayats by way of grants in-aid

| Place | ANOVA | | | | | |
|---|---|---|---|---|---|---|
| | | Sum of Squares | df | Mean Square | F | Sig. |
| Thiruppasur | Regression | 635285833288.896 | 1 | 635285833288.896 | 333.074 | 0.000** |
| | Residual | 17166089614.104 | 9 | 1907343290.456 | | |
| | Total | 652451922903.000 | 10 | | | |
| Siruvanoor | Regression | 252761081427.782 | 1 | 252761081427.782 | 95.710 | 0.000** |
| | Residual | 23768252974.218 | 9 | 2640916997.135 | | |
| | Total | 276529334402.000 | 10 | | | |
| Agoor | Regression | 1295633394981.841 | 1 | 1295633394981.841 | 83.928 | 0.000** |
| | Residual | 138936512055.159 | 9 | 15437390228.351 | | |
| | Total | 1434569907037.000 | 10 | | | |
| Pattabiramapuram | Regression | 1077601999840.457 | 1 | 1077601999840.457 | 61.431 | 0.000** |
| | Residual | 157876176030.543 | 9 | 17541797336.727 | | |
| | Total | 1235478175871.000 | 10 | | | |

***represents at 1% level of significance*

The Table 12 demonstrates the results of ANOVA test conducted to test the hypothesis that there is no significant difference between various years in respect of Grant-in-Aid of Thiruppasur, Siruvanoor, Agoor and Pattabiramapuram Village Panchayats in the reference period. All the panchayats p value is less than 0.01. Therefore, the null hypothesis is rejected at 1% level of significance. *It is concluded that there is significant difference between various years in respect of Grant-in-Aid of Thiruppasur, Siruvanoor, Agoor and Pattabiramapuram panchayats from the year 2001-02 to 2010-11.*

*Null Hypothesis: 3*

*Table 13:* There is no significant difference between various years in respect of total Non – Tax revenue of sample Village Panchayats from 2001-02 to 2010-11.

| | ANOVA | | | | | |
|---|---|---|---|---|---|---|
| | | Sum of Squares | df | Mean Square | F | Sig. |
| Thiruppasur | Regression | 124039803641.160 | 1 | 124039803641.160 | 11.746 | 0.008** |
| | Residual | 95044542309.216 | 9 | 10560504701.024 | | |
| | Total | 219084345950.376 | 10 | | | |
| Siruvanoor | Regression | 64286897020.236 | 1 | 64286897020.236 | 6.628 | 0.030* |
| | Residual | 87298533261.886 | 9 | 9699837029.098 | | |
| | Total | 151585430282.121 | 10 | | | |
| Agoor | Regression | 12847279709.184 | 1 | 12847279709.184 | 18.047 | 0.002** |
| | Residual | 6406884110.816 | 9 | 711876012.313 | | |
| | Total | 19254163820.000 | 10 | | | |
| Pattabiramapuram | Regression | 442498018.184 | 1 | 442498018.184 | 22.929 | 0.001** |
| | Residual | 173690364.816 | 9 | 19298929.424 | | |
| | Total | 616188383.000 | 10 | | | |

***represents at 1% level of significance*

The Table 13 shows the results related to the testing of hypothesis that there is no significant difference between various years in respect of total Non-Tax revenue of Thiruppasur, Siruvanoor, Agoor and Pattabiramapuram Village Panchayats in the reference period. All the panchayats p value is less than 0.01 except Siruvanoor village panchayat. Therefore, the null hyphothesis is rejected at 1% level of significance. *It is concluded that there is significant difference between various years in respect of Total Non-Tax revenue.* The Siruvanoor Village Panchayat's p value is less than 0.05. However, the null hypothesis is rejected at 5% level of significance.



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*Null Hypothesis: 4*

*Table 14:* There is no significant difference between various years in respect of funds received for implementing centrally sponsored schemes by the village panchayats

| Place | ANOVA | | | | | |
|---|---|---|---|---|---|---|
| | | Sum of Squares | df | Mean Square | F | Sig. |
| Thiruppasur | Regression | 6071006782243.075 | 1 | 6071006782243.075 | 43.594 | 0.000** |
| | Residual | 1253375951004.534 | 9 | 139263994556.059 | | |
| | Total | 7324382733247.609 | 10 | | | |
| Siruvanoor | Regression | 2318368288009.351 | 1 | 2318368288009.351 | 5.917 | .038 |
| | Residual | 3526118133201.649 | 9 | 391790903689.072 | | |
| | Total | 5844486421211.000 | 10 | | | |
| Agoor | Regression | 5843731309307.439 | 1 | 5843731309307.439 | 140.090 | 0.000** |
| | Residual | 375426713256.561 | 9 | 41714079250.729 | | |
| | Total | 6219158022564.000 | 10 | | | |
| Pattabiramapuram | Regression | 6161169853740.261 | 1 | 6161169853740.261 | 34.624 | 0.000** |
| | Residual | 1601494071570.741 | 9 | 177943785730.082 | | |
| | Total | 7762663925311.001 | 10 | | | |

***represents at 1% level of significance*

The Table 14 reveals the results of ANOVA test conducted to establish the hypothesis that there is no significant difference between various years in respect of funds received for implementing centrally sponsored schemes by the village panchayats in the reference period. Since the p value of all the panchayats except Siruvanoor is less than 0.001 the null hypothesis is rejected at 1% level of significance. Therefore, it is concluded that there is significant difference between various years in respect of funds received for implementing centrally sponsored schemes by the village panchayats from 2001-02 to 2010-11. As far as Siruvanoor village panchayat is concerned, p value is greater than 0.05. Therefore, the null hypothesis is accepted at 5% level of significance. *It concluded that there is no significant difference between various years in respect of funds received for implementing centrally sponsored schemes by Siruvanoor Village Panchayat.*

## XIII. Conclusion

It is evident from the analysis that the revenue composition of the four village panchayats during the study period provides a mixed picture. All items of revenue have been showing an increasing trend over the ten year period. There has been substantial and consistent increase in the amount of grant-in-aid received by the village panchayats in the ten year study period. In 2010-11 period, all the four village panchayats had seen quantum jump in grant-in-aid which strikingly establishes the interest and commitment of the state government to support the development initiatives of backward village panchayats. However, the flip side of the story is the direct tax revenue of the four village panchayats has not increased significantly during .the study period. The main factors responsible for the poor tax revenue are poor tax base, lack of sophisticated and adequate tax collection machinery, undervaluation of properties and indifference in imposing taxes. Non-tax revenue, although showing an increasing trend like the tax revenue, did not increase substantially. This is due to the low rates of fees charged by all the four village panchayats. There is immense potential exist in mobilising this resource in all the four village panchayats which has been observed by the researcher during the field visits. The fund for central government sponsored schemes also did not show a remarkable increase. Thus the entire four village panchayats of Thiruvallur and Thiruttani Taluks were largely depend on grants-in-aid. Besides the researchers observe the following trends during the study period:

- Grant-in-aid continuously dominated the total revenue of village panchayats in the study period. Grant in aid revenue has shown the highest rate of increase every year.
- House tax and stamp paper tax revenue constitutes major share in the tax revenue of village panchayats in the study period.
- Although an increasing long term trend is observed in the funds for central government sponsored schemes, no consistent increase has taken place in this item of revenue over the period. The proportion of this item to the total revenue also has not in stable condition during the study period.
- It is observed that professional tax has contributed substantially to the total tax revenue of village panchayats in the study period.
- A drastic change has taken place in the revenue composition of village panchayats during the study period. This is mainly because of the fact which has already been referred, i.e., increase in grant-in-aid.



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- The main concentration of allotted fund through MPLADS was making infrastructure facilities in rural areas for rural development. The scheme benefits the local community by meeting its various developmental roads, like construction of bridges, lying of cement concrete roads and installation of solar streetlight, provision of additional burial grounds, and compound wall or fencing to the burial grounds and for slab culvert.
- The Government of India has revised its guidelines for the rural water supply scheme to provide for a 10 percent weight age in allocation of funds to States. This weight age is given for the rural population managing their water supply schemes. In this study area, under the NRDWP total number of 94 works has taken and the amount sanctioned for Rs.6.96 lakhs in 2013-14.
- The Government have ordered that the vertical sharing ratio for devolution of State Finance Commission Grant to rural and urban local bodies will be continued as 58:42 and ordered to apportion the devolution grant for Rural Local Bodies among the Village Panchayats, Panchayat Unions and District Panchayats in the ratio of 60:32:8 respectively.
- The Infrastructure Gap Filling Fund, 50% shall allocate towards Village Habitations Improvement Scheme (THAI).The remaining 50% of the Fund, a part of the amount allocated to the Director of Rural Development for providing basic amenities in the Districts, the balance allocated to the Districts based on population, and the District Collectors shall utilize the funds for the same purpose.
- In this study area, there are 18 works taken up and sanctioned amount of Rs.710.28 lakhs under this Infrastructural Gap Filling Funds fully utilized.
- In the study blocks of Tiruvallur District the RBMS Scheme is implemented in all 140 Village Panchayats of 4 Panchayat Unions
- Tamil Nadu is the only State focusing on 'Habitation' as the unit of development and no other State in the country is implementing such an innovative scheme.
- There are only 6 percent have more than 25 habitations in the study area. Its result, the infrastructural gaps was filled maximum.
- In the study area, under the CMSPGHS there are 1671 solar powered energy houses constructed at a cost of Rs.2646.90 lakhs.
- In the study area, the CSIDS implemented during the year 2012-13 and an amount of Rs.49.317 lakhs allocated.
- In this study area, The MLACDS during the years 2010-11 to 2013-14, 614 works have completed with the sanctioned amount of Rs.1043.80 lakhs and the 99.9 percent of amount as spent in creation of infrastructural facilities to develop the economic and social conditions of the rural masses.
- The SSS scheme during 2011-12 to 2013-14 the sanctioned amount of Rs.310.14 lakhs fully was utilized for purchasing furniture to Government and panchayats union schools and for up gradation of the roads in the study area.
- In the study area, the amount of Rs.336 lakhs sanctioned under the scheme RISCW and 140 works related to sanitation have been completed thus ensuring safer, healthy and wealthy life to women in the selected blocks.
- The total 400 beneficiaries, 360 persons have expressed their satisfaction about education facility and only 40 persons have expressed dissatisfaction in the study area.
- The total 3, 02,549 beneficiaries benefitted under the selected schemes in the study area.

## References Références Referencias

1. Maddick (1963),"Democracy, Decentralisation, and Development", Asia Publishing House. Mumbai.
2. Oates, Wallace, E. (1972), "*Fiscal Federalism*", Brace and Jovanovich. New York.
3. Mueller, Denis C. (1979), "Public Choice" Cambridge University Press, London
4. Oppenheimer, Joe. 1981. Does the Route to Development Pass through Public Choice' In Russel, C.S. AND N K Nicholson (eds.) *Public Choice and Rural Development*. Washington DC: Resources.
5. Ledyard, J. C. 1984. The Pure Theory of Large two Candidate Elections, *Public Choice* 44 (1):7-41.
6. Rondinelli, Dannis, James S McCullough d Ronald. W. Jonald 1989. Analyzing decentralization politics in developing countries: Analyzing political Economy Framework *Development and Change,* 20 (1): 57-87.
7. Prud'homme, Remy. (1995), The Dangers of Decentralisation, *The World Bank Research* Observer, 10 (2): 201-20.
8. Breton, Albert.(1996), *Competitive Government: An Economic Theory of Politics and Public Finance,* New York: Cambridge University Press.
9. World Bank. (1997), *Expending the Measure of Wealth: Indicators for Environmentally Sustainable Development,* Washington DC: World Bank.
10. Rao, M Govinda. (2002), Fiscal Decentralisation in Indian Federalism. In Ahmed Ehtisham and vito Tanzl (eds.), *Managing Fiscal Decentralisation,* London: Routledge.
11. https://en.wikipedia.org/wiki/Vaikunda_Perumal_Temple,_Uthiramerur
12. https://web.archive.org/web/20080714154459/http://www.hindu.com/fr/2008/07/11/stories/2008071151250300.htm

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13. https://tnrd.gov.in/policynotes/rd_policynotes_2012_2013.pdf.
14. https://www.panchayat.gov.in/documents/20126/0/Statistical+handbook_MoPR+02082019.pdf/4988ca1b-4971-1f3b-54e7-980228eb47f9?t=1564729098415
15. https://www.tn.gov.in/rti/proactive/rural/handbook_RD_PR.pdf
16. https://tnrd.gov.in/panchayatraj_inst/state_finance_commission.html



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# Access to Education and Income Inequality Nexus: Findings from a Cross-Sectional Survey

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*Abstract-* The study examines how unequal access to education affects individuals' future income generation. An individual's access to education has been defined by certain key variables – family size, the distance of the school from home, location of the school, level of education of parents, availability of financial aid, expenditure on education, quota facility, etc. The study is cross-sectional in nature, drawing data from employees of all levels working at the Bangladesh University of Professionals. The paper reveals that an individual's level of education, parents' education level, expenditure on education, financial aid, and quota facility have a significant positive effect on income generation in the future. On the contrary, family size, both location and distance of the school have a negative impact on income generation. It is shown that access to education is hindered for individuals completing schools at sub-urban or rural locations than those from urban regions which culminate into the lower-income generation in the future.

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# Access to Education and Income Inequality Nexus: Findings from a Cross-Sectional Survey

Md. Monir

*Abstract-* The study examines how unequal access to education affects individuals' future income generation. An individual's access to education has been defined by certain key variables – family size, the distance of the school from home, location of the school, level of education of parents, availability of financial aid, expenditure on education, quota facility, etc. The study is cross-sectional in nature, drawing data from employees of all levels working at the Bangladesh University of Professionals. The paper reveals that an individual's level of education, parents' education level, expenditure on education, financial aid, and quota facility have a significant positive effect on income generation in the future. On the contrary, family size, both location and distance of the school have a negative impact on income generation. It is shown that access to education is hindered for individuals completing schools at sub-urban or rural locations than those from urban regions which culminate into the lower-income generation in the future.

## I. Introduction

Education is one of the prerequisites for building human capital, an ingredient necessary for developing a nation. Education is highly significant in determining future income levels. An individual with more education consumed is more likely to generate a higher amount of income since that individual, through years of education and training, has been able to prove them fit. However, the question remains why certain individuals fail to avail themselves of education.

Due to the prevalence of poverty, individuals vary in terms of available opportunities at their hands. While higher education often means higher income, several variables determine access to education – such as cost of education, family's financial condition, family size, aspirant's gender, etc. Besides, in this country, the quality of one's education is determined by the type of school one attends. Also, the distance from the institutions poses constraints in how one receives education and reap its benefit in the future.

Historically, investing in education has always been celebrated across nations for building efficient human capital and eradicating the existing inequality. In the same line of thought, Bangladesh has also increased its education investment. However, over the years, GDP has boosted, but the quality of education remains still questionable. Although the poverty rates in the past have dropped quite significantly, income inequality is still on the rise. This income inequality can be catalyzed and generated by several factors. Education is frequently mentioned as one of these factors. And education status is substantially impacted by the access opportunity to education which is assumed to be highly dependent on family wealth. Nexus between education and income are remarkably correlated because the educated are highly eligible to apply for a job in the formal sector, whether an uneducated could not apply in the formal sector. So, it is like a trap that education determines the income level, and income influences the amount of wealth, which has a direct impact on educational access.

## II. The Rationale for the Study

Bangladesh has achieved exceptional growth in terms of GDP. But there is a controversy regarding this growth. Could this growth represent the original scenario of the livelihood of the lower-class people? Though the GDP has increased in the recent year, it is evident from the report of Household Expenditure and Income Survey report of 2019 that the Gini Coefficient of Bangladesh is 0.482, which indicates that Bangladesh is running through a critical situation in terms of inequality. As per the CPD 2018, the real income of the bottom 5% of households declined to TK 733 in 2016 from TK 1682 in 2010, but the real income of the top 5% has increased on the same period. So, it is evident that the top 5%'s newly increased income is represented in GDP growth, but the lowest 5%'s dropping income is not reflected in this increased GDP. The government should ensure that everyone benefits from economic growth. The government needs to ensure equitable growth, but from the report of CPD and HIES, it is evident that the increasing GDP is not inclusive. Abhijit Banarjee and Esther Duflo identified that inequality is increasing day by day in developing countries because of unequal opportunities of basic needs. One such basic need is access to education. As per the human capital theory, education has become a crucial variable in income distribution, and the success of education greatly depends on the access level of education. So, it is quite obvious that there is a relationship between unequal income and unequal access to education. Or, more aptly put, one catalyzes the other. Bangladesh recently enacted the Eighth Five-Year Development Plan, and

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inequality is seen as a major impediment to growth in all of these initiatives.

## III. A Brief Overview on Previous Empirical Investigations

Access to education depends on economic, demographic, and geographic variables. There are empirical shreds of evidence that education has a positive relationship with income generation.

Distance to school tends to be important for students across the income spectrum, but particularly for students from low-income households. According to a study by Frenette in Canada, about 27% of students from upper-income families attend university shortly after high school, which is roughly 1.5 times higher than students from middle-income families and roughly three times higher than students from lower-income families (Frenette, 2002).

According to Igboh, Emmanuel study there is a positive relationship between school distance and male and female students' academic achievement, and the findings also revealed a weak positive relationship between school distance and male students' school attendance, while the findings revealed a weak negative relationship between school distance and female students' school attendance in Nigeria. (Stanley et al., 2017).

The educational and social status of their parents has an impact on their children's educational experiences. Since educational persistence is linked to better job market results (Alcaraz, 2020).

The number of siblings which is related to family size has an important and negative effect on education, according to the regression equation of siblings on educational achievement but the results are constrained in that they only illustrate the indirect impact of the number of siblings on potential earnings through educational attainment. (Gede & Wisana, 2019).

Siblings' education has great implications on education attainment. The relationship with older siblings lowers the performance of children in low-income families in England, while it increases the performance of children in higher-income families. (Nicoletti & Rabe, 2019).

Agguire, Matta study showed that prior admission of their older siblings has a major impact on the college option of their younger siblings, according to this study (Aguirre et al., 2021). Older siblings' choice of education also influences financial assistance programs are inadequate to address an unfair allocation of postsecondary education's economic resources.

Need-based student financial assistance helps to improve equality of opportunities by expanding higher education enrollment, enabling students to choose from a wider variety of educational choices, and motivating students to stay in school longer. It can also minimize the financial cost of college for low- and middle-income families (Hansen, 1983)

Coady and Dizioli's study findings highlight the critical role that education investments can play in reducing income inequality, especially the critical role that education expansion policies emphasize more equitable access to education. When dynamic panel estimation techniques are used, the positive relationship between education and income inequality becomes somewhat greater, statistically significant, and consistent across estimators. (Coady & Dizioli, 2017).

Rodríguez-pose and Tselio obtained that previous-period income inequality influence current-period income inequality (Rodríguez-pose & Tselios, 2008).

Mexican government rolled out Oportunidades (originally called PROGRESA), an innovative, wide-scale government cash transfer program that gives grants to low-income mothers to offset the real and opportunity costs of sending their children to school. Money is given to mothers instead of fathers in order to ensure that the money reaches their children. The popularity of this policy, as well as educational policies that make primary education compulsory, has resulted in nearly 100% primary school attendance in Mexico (Alcaraz, 2020).

In association with the fact that working parents earn more money and can easily replace parental time care by engaging in high-quality specialized childcare. Others consider the loss of parental time care to be a downside (Yang & Bansak, 2019).

Frenette's study only examined the probability of attending university shortly after high school graduation and focused on geographical location. The study was based on student who was about to graduate high school. The study did not focus on primary and secondary going students. This study is applicable for high-income countries with less population as it was studied in Canada. (Frenette, 2002). Also, the prevalence of student loans and higher returns in developed countries like Canada is also a crucial determinant of higher study which is not seen in the least developed countries.

According to Stanley's research, the distance was defined as short when distance is 1 or 2 K.M. and far when distance 3 or 5 K.M. If we study the relationship of education attainment and distance of educational institutes of different degrees of education the distance should be defined more vastly. (Stanley et al., 2017). In the Bangladeshi context mostly, academic performance is judged upon public exam result in primary and secondary and CGPA at tertiary level.

As stated in Alcaraz's study on the relationship between education and parents' status there was government cash transfers to parents especially mothers to mitigate the opportunity cost of sending their children to schools. This policy not yet been adopted in Bangladesh. However, we can study the effect of



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government-based scholarship, given to meritorious student for their performance in public exams (Alcaraz, 2020).

Nicoletti and Rabe study was based only on the National curriculum, some countries might have a diverse curriculum. So, the effect of siblings on education attainment might vary in the least developing countries (Nicoletti & Rabe, 2019). Study of Coady and Dizilio the economic analysis with a human capital model which only contains income and years of schooling and disregarded the wealth effect on education (Coady & Dizioli, 2017). According to Gade and Wisana study in China has little shortcoming as China has adopted one-child policy in 1980, So the household is likely to have less no. of children and resulting in fewer siblings.

## IV. The Objective of the Study

*Broad Objectives:* The main objective of this study is to investigate the relationship between inequality in access to education and income distribution.

The study aims to reveal the following –

(i) To identify the causes that create inequality in accessing education.
(ii) To reflect on the nexus between unequal access to education and income distribution.

## V. Data and Research Methods

The study follows both quantitative and qualitative. For the quantitative section, primary data have been collected through an in-person self-administered questionnaire-based field survey. Respondents answered 30 questions on their current income, education qualification, the geographical location of birth, family income, parents' education, etc. Human capital is largely dependent on the time allocation on education and also on the quality of educational institutions. So, for a better understanding of the existing unequal access to education, respondents were also asked about the location of their institutions and the distance from the residence. Access to education is highly dependent on the concurrent income of the family. So, we collect data of the present income of the individuals and the past income of their family during his studentship which is accounted long years ago. We have also collected data about the number of total brothers and sisters because a constant family income per capita expenditure on the education of a family is inversely related to the total number of brothers and sisters of the family. Geographical location has a great impact on access to educational institutions. So, respondents were also asked about their geographical location. Access to education is largely dependent on the availability of the study materials and also dependent on the availability of the family to bear the educational expenses. So, all the respondents are asked about their type of school, whether that was a private school or NGO-based school, or Government school. There is a positive impact of the scholarship on access to education. So, the respondents are also asked about whether they received any scholarship or financial aid during their study life. The sample has been formed with 50 respondents; among them, 2 have been dropped due to not providing sufficient and coherent information for analysis. The survey respondents are current employees serving at the Bangladesh University of Professionals. Among the 48 respondents, 34 were male and 16 were female. For the quantitative section, descriptive statistical analysis was performed. Multivariable regression analysis and binary logistic regression techniques have been used to find the stated nexus. Partial and total correlation analyses have been run to detect the association among the variables. A necessary diagnostic test has been done for further assurance. MS Excel and STATA have been used for analysis. Though we avoid the impact of years of job experience on income there is an interview on the interview section to represent the impact of job experience besides educational qualification on income generation.

To understand the nexus between income inequality and education level, the study, and examination of enrollment rates in primary and secondary schools are very crucial. The secondary data of primary and secondary school enrollment has been used from the data bank of the World Bank.

For the qualitative analysis, three employees from BUP were interviewed upon conditional consent of not being willing to disclose their identity. Among them, one respondent answered partially in the interview-based survey.

### a) *Limitation of the Survey*

Due to the pandemic situation and time shortage, the survey was confined in BUP. There were some difficulties while collecting data. First, there were some sensitive questions in the questionnaire such as family income, family wealth. Some respondents were unwilling to give information about their income and wealth. Second, the survey time was during office hours, so the respondents were busy, and some of them refused to fill up the questionnaire as they were involved in official duty. Thirdly, most of the respondents were asked to brief about the study that took a lot of time. Fourth, the faculties were very cooperative, and they were the majority who submitted the questionnaire most. It created biases in the study. Lower-level staff hesitated to fill up the questionnaire. Fifth, there were some administrative restrictions, and we could not collect data from the admin building. The respondents were from academic building. Finally, lack of incentive and absence of any reward for completing the questionnaire there were fewer respondents. We need



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to drop some important variables due to missing response, partial response and outlier observations.

## VI. Results and Discussions

This section of the study reflects on the overall status of the respondents from different dimensions, such as condition of the current income, family wealth, educational qualifications, etc. The lowest monthly income was 1000 BDT, and the highest was 130000 BDT. The average monthly income of the sample is 34,139 BDT. The following frequency distribution table gives a better idea regarding the monthly income of all respondents.

*Table 1:* Frequency distribution of income of the respondents

| Income Range | Frequency | Cumulative Frequency | Relative Frequency | Percentage |
|---|---|---|---|---|
| 1000-20000 | 7 | 7 | 0.145833 | 14.583 |
| 20000-39000 | 22 | 29 | 0.458333 | 45.833 |
| 39000-58000 | 16 | 45 | 0.333333 | 33.333 |
| 58000-77000 | 2 | 47 | 0.041667 | 4.167 |
| 77000-96000 | 0 | 47 | 0 | 0.000 |
| 96000-115000 | 0 | 47 | 0 | 0.000 |
| 115000-134000 | 1 | 48 | 0.020833 | 2.083 |
| TOTAL | 48 | - | 1 | 100 |

The table clearly shows that the largest number of respondents fall under the monthly income bracket of 20000 to less than 39000 BDT, which is 45%. However, the second largest (33%) group concentrates under the 39000 to less than 58000 BDT. For better understanding, the following bar graph is helpful.

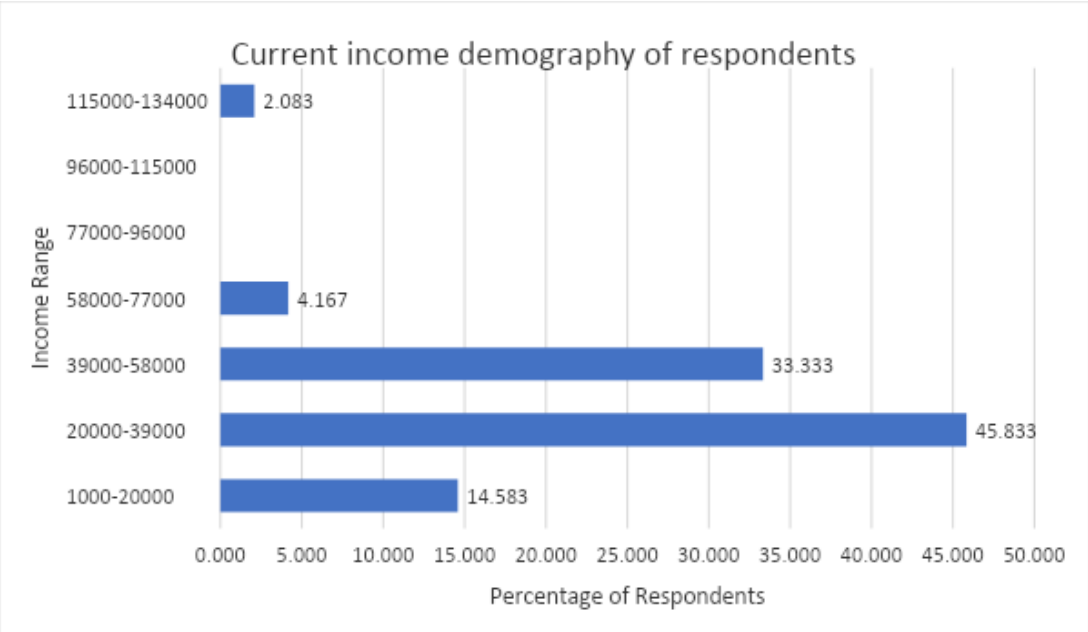


*Figure 1:* Current income demography of respondents

*Educational Level of Respondents*

*Table 2:* Educational level of the Respondents

| Education Level | Frequency |
|---|---|
| Primary | 1 |
| SSC | 9 |
| HSC | 5 |
| Honor's | 1 |
| Master's | 32 |



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The survey sample shows that the majority of the respondents have completed a master's degrees. nine respondents have completed SSC only, while five have completed HSC.

The respondents were also asked about their expenditure on education while they were students. The average expenditure on education of the sample is 3043 BDT per month and additional expenditure for buying stuff like pen, pencil, books and coaching etc. was 998 BDT per month. The following graph exhibits the additional expenditure in a better manner.

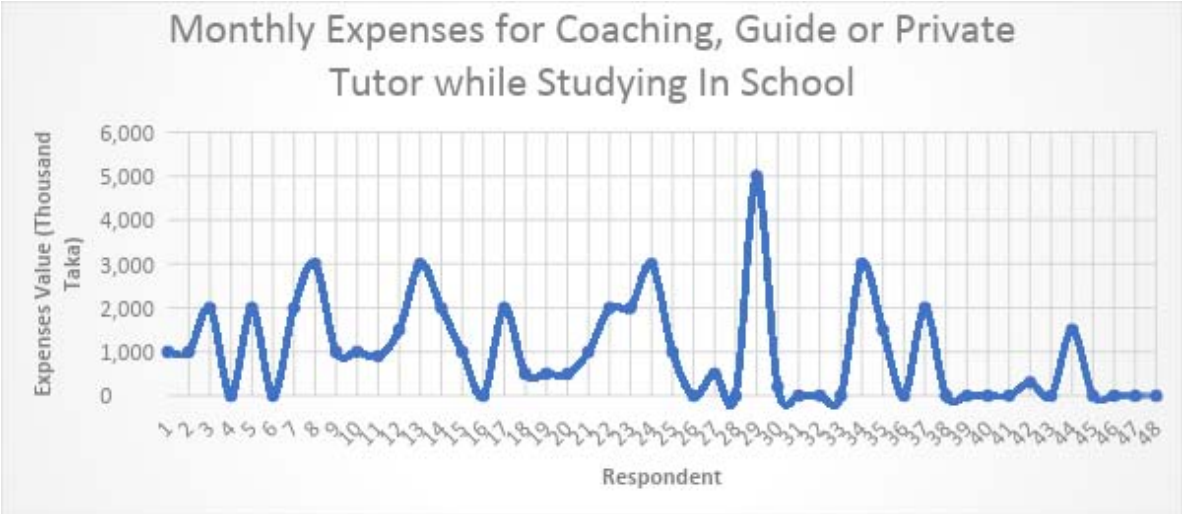


*Figure 2:* Monthly educational expenses of the respondents.

| Name of Variable | Coefficient | Standard Error | P Value |
|---|---|---|---|
| Level of Education | 3015 | 0.621 | 0.053 |
| Family Income while Studying | 1.730 | 0.543 | 0.041 |
| Parents Education | 2.967 | 0.432 | 0.052 |
| Expenditure on Education | 3.757 | 0.832 | 0.026 |
| Family Size | -270 | 0.732 | 0.035 |
| Financial Aid | 0.527 | 0.243 | 0.061 |
| Quota Facility | 0.513 | 0.362 | 0.071 |
| Location of School | -1253 | 0.034 | 0.031 |
| Distance of School | -2365 | 2.134 | 0.041 |
| Transportation | -1421 | 1.74 | 0.023 |

*R Square = 0.73*
*Adjusted R Square = 0.71*

*Figure 4:* Regression Result

In partial correlation analysis, it shows a positive association between the current monthly income of the respondents and the income of their respective families. The coefficient of correlation is 0.55. In the regression analysis it shows, all the other variables remain constant, if the family income increase by 1000 taka, the current income of the respondent is increased by, on average, around 1730 taka at 5% level of significance. Family income is also positively associated with the current wealth of the respondent (correlation coefficient 0.57). And the regression result shows that, if the family income increases by taka 1000, the current wealth of the respondent increased by taka 1796 on an average.

The current income of the respondents is also associated with the education level of the parents. Regression result shows a significant relationship between the respondent's current income and the education level of the parents. It shows that the current income of the respondents increases by around 2967 taka if the years schooling of the parents is increased by one year on an average, all the other variables remain constant.

Our study finds that respondents with higher expenditure on education have more current income. All the other variables remain constant, if the education expenditure of the respondents during their study life increase by taka 1000 per month, the current income of the respondents increases by taka 3757 per month. The impact of the expenditure on education is more on the



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primary and secondary levels. If we add the gender dimension in the analysis, we can see that the average expenditure of education on female is 40% lesser than their male counterpart. Which is also reflected in their respective monthly current income. In our survey result, we can see that the income gap between male and females is about 53 percent.

Family size shows a significant role in defining the income distribution in the study. As the number of family members increases by one, the average current monthly income of the respondent decreases by taka 270 with 5% level of significance. Again, we see a positive association between the number of educated siblings and the current monthly income of the respondents.

In our analysis, we see that there is a significant role of financial aid on the income of the respondents. Respondents who have received any financial aid during their study life have more current income than others. The regression results show that the current income of the respondents increases by taka 527 if the financial aid received by the respondents amounts to 1000, all else equal.

And it is as expectedly, level of education significantly explained the current income of the individuals. As per the regression result, we can see that, as the years of schooling of the respondent increase by 1 year, the current monthly income of the respondent increases by taka 3015.

The study shows significant relationship between the current income of an individual and the distance between educational institutions from the home of that individual. Individual's current income declines when the distance of the school from home increases.

Respondents were asked about the type of school they studied based on the geographical location-metropolitan, urban, semi-urban, and rural. In our study, we see that the income of the individuals studied from metropolitan city are higher than the rural. We did not find any significant relationship between quota facilities and the current income of the respondent at 5% level of significance.

*a) Interviews*

The quantitative analysis shows that there are some variables that define the access to education have significant impact on the income of the individuals. Three distinct interviews reveal that there is a strong nexus between unequal access to education and income inequality.

*Interview 1*

Mr. Jahid (anonymous name) is an employee of BUP. He is now serving as a vehicle driver of BUP. His current income is around 30,000 BDT. He is the eldest son of his parents. He has 5 other brother and sisters along with him. His father was a farmer who operated on his land. At that time, their current income was treated as a lower level of income. But after 1971, his father lost his ownership of land because they had to flee away to India during the war, and when they returned to Bangladesh, they found that they lost their ownership. As a result, their income level declined. And Mr. Jahid needed for dropping out of school. When asked about the reason to drop out, he answered that though he read in a government school free of cost, there were some other costs related to study, such as – the cost of buying the reading materials. He was more concerned about the opportunity cost of study rather than the direct cost. He invested his study hour in agriculture to help his father to generate more income to meet up their basic needs. He had not enough wealth in reserve to support them in times of crisis. As a result, he had to leave his study forcefully. Though he was intended to start studying after three years after his father's death, it had become impossible for him to attend school because he need to support his other 5 brothers and sisters to lead their basic life. Ultimately three of his brothers and sisters were unable to attend school more than secondary level because only till the secondary level the direct cost of the study is lower than compared to the higher level. Moreover, his two sisters got married because they thought that it will be better for them if their sisters get married early. After all, they thought that their sisters could lead a better life after marriage. So, as a result, their two sisters remained uneducated. As the job of higher-income requires higher educational background so none of them can apply for the top graded job. Ultimately, they could not participate any job of a higher level of income. Ultimately, he is confined with the low-income. He could not apply for a promotion because to get promotion he needs an HSC certificate, which does not belong to him. This is not the end of the story. As his income is not enough to support his family to lead a smooth life so his eldest son Jamal (anonymous name) could not attend formal education after college level because during 2011, Mr. Jahid faced a road accident and was unable to support his family financially so, forcefully, his eldest son needs to attend work to support his family. Ultimately his son also get trapped and was unable to achieve higher education, and ultimately, he could not apply for the jobs of higher income. So, his full family has got trapped in poverty which increases inequality.

*Interview 2*

Another respondent named Mr. Foysal (anonymous name) is operating as an employee in the admin block of BUP. He stated that his father was also a farmer. He is the 4$^{th}$ among his 7 brothers and sisters. Though his two elder brothers operate as farmers, his immediate elder brother is serving as a soldier in Bangladesh Army. So, basically, two of his elder brothers were not even class-8 graduates. But the other 5 brothers and sisters were educated. When asking



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Mr. Foysal about the reason for not receiving further education of his two elder brothers, he replied that his younger two brothers supported all of their brothers and sisters financially. They did not have enough wealth to meet their basic needs. So, his two elder brothers served as the earning member of their family. So, it is clear that his two elder brothers could not attend school due to financial problems, and it is a matter of concern that the income of those two elder brothers decreases day by day. And they could not increase their income because they were not educated. Hence, agriculture was the only earning source of them and day by day, the fertility rate of their land was decreasing which led to the decreasing rate of their income. So, it is evident that income generation is greatly affected by the education level. And Mr. Foysal was able to get an education because he got enough support and access to the education which is ensured by his eldest two brothers. And now Mr. Foysal is operating as an admin officer and could apply for promotion policy because of his eligibility which is ensured by his education level. And as Mr. Foysal gets an opportunity to gather higher income. As a result, his youngest brothers and sisters are also engaged in higher education. It is expected by Mr. Foysal that all of them will be able to generate higher income and thus will be able to get out of the trap of poverty. As per Mr. Foysal, education level works as the major determinant of income generation. Because 20 years earlier, their total wealth was less than the present level, and as a result, their per head wealth was less than their need, but now it has increased, which could facilitate them to reduce their income inequality.

*Interview 3*

Mr. Fahim (anonymous name) is an employee of the BUP admin block. His father was a school teacher, and he is the eldest among his three brothers. The earning of his father was not enough to support their family to lead their daily life smoothly. His mother was suffering from Cancer. So, his father needed to spend extra money on the treatment of Mr. Fahim's mother. And after a few years, his mother passed away. Moreover, the death of his father during his college life affected their daily life badly. So, at a period, it was tough enough to continue his study, but fortunately for his result, he got a scholarship in class 5 and in class 8. As he was a meritorious student, so he used to earn his cost of study by doing tuition from the very beginning of his college life which help him to continue his study smoothly. He thought that without his earnings it was tough for him to continue his college because his father was not able enough to continue the cost of his study along with his mother's expenses. He concludes that he thinks that scholarship helped him to remove stress which help him to concentrate on his study properly and to achieve meritorious results which helped him to get the job with a handsome income.

*Interview 4*

Mr. Aziz (anonymous name) is an employee of BUP. He is operating as the in charge of his sector. His current income is stated around 39000 BDT. It is his own belief that his education qualification is not good enough to get this amount of salary, but he has experience of 18 years of doing a job in this sector. He has more practical knowledge about his job rather than theoretical knowledge which helps him to ensure a better level of income. He thinks that if he had better educational qualifications then could earn more, or he could earn this level of income at an earlier stage of his income life. That is, it is also evident that besides the education level, the years of job experience has an impact on the level of income generation.

From the interview of these three individuals, it can be concluded that the wealth or income level of a family has a huge impact on access to education. Individuals with better family conditions and higher family income can easily avail the opportunity of education. However, for cases as above, the poverty trap and other circumstances put constraints on individuals. As a matter of fact, an individual fails to utilize the access to education and drops out. This ultimately affects the future income of that individual since higher educational qualification necessarily translates into better paying jobs. Again, under such conditions, the future generation also becomes vulnerable.

*b) Limitations of the Study*

The maximum respondents are employed as faculty members and officers engaged in academic section, but the other stuffs and officers did not respond accordingly. As a result, the sample is biased and depicts only the scenario of employees of faculty members at BUP. Also, paucity of funding simply translated into failure in expanding the sample collection from other universities. Thirdly, due to COVID-19, it was impossible to collect the required data from the targeted universities. The paper also lacks data about the respondents' wealth. Respondents did not feel comfortable while answering about the amount of wealth during the data collection period. Moreover, most of the respondents have lack of idea about their family wealth during their studentship because it is hard to recall about the amount of total family wealth which was available around 10 or more years ago. Moreover, we have not collected data about their years of experience in job sector which could positively impact the level of income generation.

## VII. Conclusion and Recommendation

The paper reveals some important insights to the problem stated throughout the paper. It is very typical and coherent that income generation has a link with the education consumed. However, the



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consumption of education solely depends on the various parameters that shape an individual's access to education. Therefore, consistent with the typical belief, access to education has an influence over the income generation of an individual, and also on income inequality as different persons have different levels of access to education.

From the discussion throughout the paper and interview insights, it is quite clear that both qualitative and quantitative findings of access to education having strong links with future income generation or income inequality holds good. This conclusion is further strengthened by the respondents' personal experience of financial backup, distance from schools, access to peripheral education, such as utilization of private coaching and affording of the notebooks. Individuals possessing the ability to afford such peripheral facilities are found to be generating higher incomes in future while those failing to afford these generate comparatively lower incomes. It cannot be disregarded that individuals vary in terms of access to education. Different persons have different experiences. An individual from an affluent family always differs in terms of choice making from someone who belongs to a lower-income family. Thus, the choice to avail education and the manner in which education has been consumed largely varies from person to person. This makes the entering portal to education life uneven for different people as they face different constraints. As a result, the future life is affected, and income inequality is created. Government and the policymakers should put more emphasis on reducing inequality in access to education to combat the on growing income inequality sustainably.

## References


1. Abdullah, A., Doucouliagos, H., & Manning, E. (2015). Does education reduce income inequality? A meta-regression analysis. *Journal of Economic Surveys*, *29*(2), 301–316. https://doi.org/10.1111/joes.12056
2. Anderson, Siwan, and Mukesh Eswaran. 2009. "What Determines Female Autonomy? Evidence from Bangladesh." Journal of Development Economics 90, no. 2:179–91.
3. Adeleye, N. B., Jamal, M. A., Ismail, M. F., & Nazeer, S. M. (2019). Income Inequality in India. xlv (37), 356–363. https://doi.org/10.4018/978-1-5225-6061-6.ch021
4. Alcaraz, M. (2020) 'International Journal of Educational Development Beyond Financial Resources : The Role of Parents' Education in Predicting Children' s Educational Persistence in Mexico', *International Journal of Educational Development*, 75(April 2019), p. 102188. doi: 10.1016/j.ijedudev.2020.102188.
5. Asadullah, M. N., & Yalonetzky, G. (2012). Inequality of Educational Opportunity in India: Changes Over Time and Across States. World Development, 40(6), 1151–1163. https://doi.org/10.1016/j.worlddev.2011.11.008
6. Begum, H. A., Perveen, R., Chakma, E., Dewan, L., Afroze, R. S., & Tangen, D. (2019). The challenges of geographical inclusive education in rural Bangladesh. International Journal of Inclusive Education, 23(1), 7–22. https://doi.org/10.1080/13603116.2018.1514729
7. Bakar, R. (2006). Education Inequality in Malaysia. The Jounal of Human Resource and Adult Learning, 2010(November 2006), 47–51.
8. Benjamin, D., Brandt, L., & McCaig, B. (2017). Growth with equity: income inequality in Vietnam, 2002–14. Journal of Economic Inequality, 15(1), 25–46. https://doi.org/10.1007/s10888-016-9341-7
9. Bodewig, C., & Badiani-Magnusson, C. (n.d.). Skilling Up Vietnam.
10. Breen, R., & Chung, I. (2015). Income Inequality and Education. Sociological Science, 2, 454–477. https://doi.org/10.15195/v2.a22
11. Chowdhury, R., & Sarkar, M. (2018). Education in Bangladesh: Changing contexts and emerging realities. *Education in the Asia-Pacific Region*, *44*, 1–18. https://doi.org/10.1007/978-981-13-0708-9_1
12. Coady, D., & Dizioli, A. (2017). *Income Inequality and Education Revisited :*
13. Chaudhry, A., Chaudhry Thompson, T., & Gera, N. (2006). T HE L AHORE J OURNAL OF Lahore School of Economics. The Lahore Journal of Economics, 11(2), 1–201.
14. Devkota, S. C., & Upadhyay, M. P. (2015). What Factors Change Education Inequality in Nepal? Journal of Human Development and Capabilities, 16(2), 287–308. https://doi.org/10.1080/19452829.2015.1029882
15. *Education Policy 2010 Ministry of Education Government of the People's Republic of Bangladesh*. (n.d.).
16. Fields, G. S. (1980). Education and Income Distribution in Developing Countries: A Review of the Literature. *Education and Income: A Background Study for World Development*, 231–315. http://digitalcommons.ilr.cornell.edu/cgi/viewcontent.cgi?article=1487&context=articles
17. Frenette, M. (2002). *Too Far To Go On ? Distance to School and University Participation Too Far To Go On ? Distance to School and University Participation By* (Issue 11).
18. Gede, I. D., & Wisana, K. (2019). *Does the number of siblings affect adult income ? An indonesian case study DOES THE NUMBER OF SIBLINGS AFFECT ADULT INCOME ? AN INDONESIAN CASE STUDY Dwi Wahyu Wijanarko*. *April*.




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19. Glomm, G., & Ravikumar, B. (2003). Public education and income inequality. *European Journal of Political Economy*, *19*(2), 289–300. https://doi.org/10.1016/S0176-2680(02)00178-7
20. Hansen, W. L. (1983). *Impact of Student Financial Aid on Access Published by : The Academy of Political Science Impact of Student Financial Aid on Access*. *35*(2), 84–96.
21. Hendel, I., Shapiro, J., & Willen, P. (2005). Educational opportunity and income inequality. *Journal of Public Economics*, *89*(5–6), 841–870. https://doi.org/10.1016/j.jpubeco.2004.11.004
22. Ismail, R. (2000). Educational and Income Inequality in Malaysia. Humanomics, 16(2), 19–40. https://doi.org/10.1108/eb018851
23. Jallade, J. P. (1982). Basic education and income inequality in Brazil. *World Development*, *10*(3), 187–197. https://doi.org/10.1016/0305-750X(82)90009-2
24. Kelly, P. J. (2005). As America Becomes More Diverse: The Impact of State Higher Education Inequality. National Center for Higher Education Management Systems (NJ1), November, 44. https://vtechworks.lib.vt.edu/handle/10919/83132
25. Khan, M. Z. U., Rehman, S., & Rehman, C. A. (2015). Education and Income Inequality in Pakistan. Management and Administrative Sciences Review, 145(January), 134–145.
26. Rahman, R. I. (2006). *Access to Education and Employment : Implications for Poverty Access to Education and Employment :14*. http://www.chronicpoverty.org/uploads/publication_files/PRCPB_WP_14.pdf
27. Psacharopoulos, G. (1977). Unequal access to education and income distribution - An international comparison. *De Economist*, *125*(3), 383–392. https://doi.org/10.1007/BF01479118
28. Ram, R. (1989). Can educational expansion reduce income inequality in less-developed countries? *Economics of Education Review*, *8*(2), 185–195. https://doi.org/10.1016/0272-7757(89)90006-X
29. Rodríguez-pose, A., & Tselios, V. (2008). Education and Income Inequality in Turkey: Does Schooling Matter? Financial Theory & Practice, 32. (3), 369–385.
30. Qazi, W., Raza, S. A., Jawaid, S. T., & Karim, M. Z. A. (2018). Does expanding higher education reduce income inequality in emerging economy? Evidence from Pakistan. Studies in Higher Education, 43(2), 338–358. https://doi.org/10.1080/03075079.2016.1172305
31. Quian, X., & Smyth, R. (2005). MEASURING REGIONAL INEQUALITY OF EDUCATION IN CHINA: WIDENING COAST-INLAND GAP OR WIDENING RURAL-URBAN GAP? Xiaolei Qian and Russell Smyth.
32. Yang, J., & Qiu, M. (2016). The impact of education on income inequality and intergenerational mobility. China Economic Review, 37, 110–125. https://doi.org/10.1016/j.chieco.2015.12.009
33. Younglives.org. (2015). Education for All in Vietnam: high enrolment, but problems of quality Young Lives Policy Brief 4.
34. Zhang, X., & Kanbur, R. (2003). Working Paper SPATIAL INEQUALITY AND DEVELOPMENT. 3(November), 1–13.



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Authors can submit papers and articles in an acceptable file format: MS Word (doc, docx), LaTeX (.tex, .zip or .rar including all of your files), Adobe PDF (.pdf), rich text format (.rtf), simple text document (.txt), Open Document Text (.odt), and Apple Pages (.pages). Our professional layout editors will format the entire paper according to our official guidelines. This is one of the highlights of publishing with Global Journals—authors should not be concerned about the formatting of their paper. Global Journals accepts articles and manuscripts in every major language, be it Spanish, Chinese, Japanese, Portuguese, Russian, French, German, Dutch, Italian, Greek, or any other national language, but the title, subtitle, and abstract should be in English. This will facilitate indexing and the pre-peer review process.

The following is the official style and template developed for publication of a research paper. Authors are not required to follow this style during the submission of the paper. It is just for reference purposes.

***Manuscript Style Instruction (Optional)***

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11'", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

***Structure and Format of Manuscript***

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

a) A title which should be relevant to the theme of the paper.
b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
d) An introduction, giving fundamental background objectives.
e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
f) Results which should be presented concisely by well-designed tables and figures.
g) Suitable statistical data should also be given.
h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
j) There should be brief acknowledgments.
k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.

## Format Structure

***It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.***

All manuscripts submitted to Global Journals should include:

**Title**

The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

**Author details**

The full postal address of any related author(s) must be specified.

**Abstract**

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

**Keywords**

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, “What words would a source have to include to be truly valuable in a research paper?” Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

**Numerical Methods**

Numerical methods used should be transparent and, where appropriate, supported by references.

**Abbreviations**

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

**Formulas and equations**

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

**Tables, Figures, and Figure Legends**

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.

**Figures**

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

## Preparation of Eletronic Figures for Publication

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution at final image size ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs): >350 dpi; figures containing both halftone and line images: >650 dpi.

Color charges: Authors are advised to pay the full cost for the reproduction of their color artwork. Hence, please note that if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a Color Work Agreement form before your paper can be published. Also, you can email your editor to remove the color fee after acceptance of the paper.

## Tips for writing a good quality Social Science Research Paper

Techniques for writing a good quality homan social science research paper:

***1. Choosing the topic***: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

***2. Think like evaluators:*** If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

***3. Ask your guides:*** If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

***4. Use of computer is recommended:*** As you are doing research in the field of homan social science then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

***5. Use the internet for help:*** An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.



***6. Bookmarks are useful:*** When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

***7. Revise what you wrote:*** When you write anything, always read it, summarize it, and then finalize it.

***8. Make every effort:*** Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

***9. Produce good diagrams of your own:*** Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

***10. Use proper verb tense:*** Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

***11. Pick a good study spot:*** Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

***12. Know what you know:*** Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

***13. Use good grammar:*** Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

***14. Arrangement of information:*** Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

***15. Never start at the last minute:*** Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

***16. Multitasking in research is not good:*** Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

***17. Never copy others' work:*** Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

***18. Go to seminars:*** Attend seminars if the topic is relevant to your research area. Utilize all your resources.
Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

***19. Think technically:*** Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

***20. Adding unnecessary information:*** Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

***21. Report concluded results:*** Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

***22. Upon conclusion:*** Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

.

## Informal Guidelines of Research Paper Writing

***Key points to remember:***

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

**Final points:**

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

*The introduction:* This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

**The discussion section:**

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

**General style:**

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

**To make a paper clear:** Adhere to recommended page limits.



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*Mistakes to avoid:*

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

**Title page:**

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

**Abstract:** This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

*Reason for writing the article—theory, overall issue, purpose.*

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

**Approach:**

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

**Introduction:**

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

*The following approach can create a valuable beginning:*

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

**Approach:**

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

**Procedures (methods and materials):**

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

**Materials:**

*Materials may be reported in part of a section or else they may be recognized along with your measures.*

**Methods:**

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

**Approach:**

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

**What to keep away from:**

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.



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**Results:**

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

**Content:**

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

**What to stay away from:**

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

**Approach:**

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

**Figures and tables:**

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

**Discussion:**

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."





Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

**Approach:**

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

## The Administration Rules

Administration Rules to Be Strictly Followed before Submitting Your Research Paper to Global Journals Inc.

*Please read the following rules and regulations carefully before submitting your research paper to Global Journals Inc. to avoid rejection*.

*Segment draft and final research paper:* You have to strictly follow the template of a research paper, failing which your paper may get rejected. You are expected to write each part of the paper wholly on your own. The peer reviewers need to identify your own perspective of the concepts in your own terms. Please do not extract straight from any other source, and do not rephrase someone else's analysis. Do not allow anyone else to proofread your manuscript.

*Written material:* You may discuss this with your guides and key sources. Do not copy anyone else's paper, even if this is only imitation, otherwise it will be rejected on the grounds of plagiarism, which is illegal. Various methods to avoid plagiarism are strictly applied by us to every paper, and, if found guilty, you may be blacklisted, which could affect your career adversely. To guard yourself and others from possible illegal use, please do not permit anyone to use or even read your paper and file.

## Criterion for Grading a Research Paper (Compilation) by Global Journals

**Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals**

| Topics | Grades | | |
|---|---|---|---|
| | **A-B** | **C-D** | **E-F** |
| ***Abstract*** | Clear and concise with appropriate content, Correct format. 200 words or below | Unclear summary and no specific data, Incorrect form<br><br>Above 200 words | No specific data with ambiguous information<br><br>Above 250 words |
| ***Introduction*** | Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited | Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter | Out of place depth and content, hazy format |
| ***Methods and Procedures*** | Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads | Difficult to comprehend with embarrassed text, too much explanation but completed | Incorrect and unorganized structure with hazy meaning |
| ***Result*** | Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake | Complete and embarrassed text, difficult to comprehend | Irregular format with wrong facts and figures |
| ***Discussion*** | Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited | Wordy, unclear conclusion, spurious | Conclusion is not cited, unorganized, difficult to comprehend |
| ***References*** | Complete and correct format, well organized | Beside the point, Incomplete | Wrong format and structuring |

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