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3.3.1 Number of research papers published per teacher in the Journals notified on UGC CARE list during the last five years

2021 – 2022

Title of paper	Name of the author/s	Department of the teacher	Name of journal	ISSN number	Proof
Epitaphs As Exponents of Literary Flavour	Dr.C.Deepa	PG And Research Department of English	Journal Of Emerging Technologies And Innovative Research	ISSN:2349-5162	Link
Space Saving Furniture As A Smart Solution For 2bhk Apartments	S.Nagasudha	Department of Interior Design And Décor	Journal Of Emerging Technologies And Innovative Research	2349-5162	Link

Academic Performance And Behavioral Change Among Online Class Attendants - Study With Reference To Digital Education	Dr.M.Sadiya Sarvath	Department Of Business Administration	Innternational Journal Of Advance And Applied Research	2347-7075	Link
Whiteness And Democracy In Philip Roth's I Married A Communist	A.Meenaz Banu	PG And Research Department of English	Journal Of Emerging Technologies And Innovative Research	2349-5162	Link
Nutritional Content And Antioxidant Properties Of Sapota Fruit Varieties	D.Sudha	PG Department of Biochemistry	International Journal Of Research In Pharmaceutical Sciences	ISSN0975-7538	Link
Certain Kinds Of Bipolar Interval Valued Neutrosophic Graphs	L.Jagadeeswari	PG Department of Mathematics	International Journal Of Neutrosophic Science	Vol.16.no1.PP.49-61,2021	Link

Women Shopping Pattern Using Social Media Offered By Home Based Women Entrepreneurs	Dr.M.Sadiya Sarvath	Department of Business Administration	Analytical Commerce And Economics	ISSN:(2582-7936) Online	Link

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JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
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Epitaphs as Exponents of Literary Flavour

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Abstract

Headstones with the Passage of Time

In olden days, stones were used to mark the graves. Stones were kept as a mark of respect to the dead. People were buried in smaller plots. And those plots were near their homes. Many of them were not buried in Cemeteries meant for the dead. An individual chamber was used to bury all the dead in the family. Time passed and churchyard burials became popular. The dead in the particular Parish were buried in the same churchyard. The .ce was owned by the church. In course of time, there came, individual or family graves. Stones were kept near the head of the dead as an honour. These Stones contained simple inscriptions such as the name of the dead. As time passed, there came a change in the process of commemoration of the dead. Short Sayings and Drawings adorned the grave stones. Elaborate funeral customs included the art of filling the headstones with literary flavour.

Symbols started appearing on such stones as a religious belief. Images such as a pair of wings were carved depending on the social status of the dead. In addition to the name of the dead, his occupation and his position in the society started appearing on the headstone. And thus, inscriptions on the stone grew with the passage of time. In recent times, these stones are becoming more personal with the help of the increased technology. Some are etching into the stone the portraits of the dead. Some are carving the pictures of the mementoes of the deceased.

Contents of Headstones

Headstones are also kept at the feet. This is to differentiate the grave from other graves. It is because all graves look mostly similar. The earliest grave markers were monuments. Such tombs were formed using large stones. Letters on the headstones varied from Carver to Carver. As calendars rolled by, monuments were created with marble which suited excellently well for hand-carving. Specialized Letter Carvers were engaged to beautify the headstones. They beautified such stones using different alphabets and lettering styles. The headstone epitaph includes the name of the dead, his date of birth, date on which he died and a Quote from the Bible or from a holy religious book.

The purpose is to speak highly of the virtues of the dead. This, in turn, will strengthen the bond between the living and the dead. It may even be a symbol that reminds the onlooker of his temporary life on earth or mortality. The epitaphs are mostly sentences from popular Poems or Songs. The inscription will stand for hundreds of years or at least as long as the headstone stands at the grave. And therefore, the Saying or the Quotation should not be chosen in a hurry. Care should be taken to write or quote a beautiful Couplet that sounds more meaningful. The simplest

Epitaphs are always the most profound. More emphasis should be laid on analyzing what should be engraved on the tombstone. Attention should be focused to choose a better, rather, the best Epithet.

Nature of Epitaphs

Epitaphs ought to be short and simple. They should be in few lines. They offer an opportunity to sum up a person's life in few words. They are like ventilators for real emotions. They convey real emotions. They convey a strong feeling. The best Epithets are eternal or last long. Once, the Epitaph is engraved, there should not be any secondary feeling to change it. Exaggerated sentimental Epitaphs should be discouraged. The Epitaph should speak directly and it means that the sentences should be clear and in a catchy one. Epitaphs can be drawn from Prose, Poetry, Drama, Fiction, Biography, Autobiography or Essay.

Epitaphs are to be chosen so that they should live long as a fitting memorial to the person who is no more. They should make the readers remember the dead person more clearly and more dearly. The Epitaph should be a free expression or celebration of life.

Only then, it will bring peace to such of those who visit the grave. And therefore, an Epitaph sh[RETURN TO HOME PAGE]e in itself.

- ❖ Some are uplifting Epitaphs.
- ❖ Some are emotional outbursts.
- ❖ Some are mourners in stone.
- ❖ Some are tears in slab.
- ❖ Some are verbal inspirations.
- ❖ Some are deep sentimentalists.
- ❖ Some are pessimistic
- ❖ Some are optimistic.
- ❖ Some are fanciful
- ❖ Some are lighter in vein.
- ❖ Some are heavy doses of tragedy.
- ❖ Some are like burnt-out candles.
- ❖ Some are torches of guidance.
- ❖ Some are like milestones on the highway of life.
- ❖ Some are path-setters.
- ❖ Some are ideals to be adopted.
- ❖ Some are an ennobled track.
- ❖ Some are like beating the bush around.
- ❖ Some are stone angels of goodwill.

Examples of Short Epitaphs:

- ❖ Beloved
- ❖ Most beloved
- ❖ Loved One
- ❖ So Loved one
- ❖ Remembered with love

- Bedded in Gods care
- Love continues forever
- Never forgotten
- Always green in memory
- Golden are the Memories
- A life well lived

Examples of Longer Epitaphs:

- You are always in my heart and memories
- Tears water our bond and growth.
- Let angels sing in chorus to rest you in peace.
- Blessed sleep be yours and yours alone.
- What we were are still we are.
- Our brief partings will bring us together again
- No one spread more love than you
- You live in the hearts of those that always love you
- Your song is ended but the melody lingers on
- No one thinks of winter when it is still spring.
- The story of your life has no end at all.

Familiar Epitaphs on Headstones:

- A colourful dream lies buried here.
- I am not today what I was Yesterday.
- Life is not about waiting for the storm to pass.
- The leaves of memory fall which are collected and preserved.
- Unseen but you are always near.
- So loved, so dearly, so close but so far.
- Let your soul stand supreme before Million Universes.

- ❖ May you be remembered as you remembered all others.
- ❖ Where there is lighter, deeper are the shadows.
- ❖ Life given to us is short but memory lives longer and longer.
- ❖ Born but died to be born again.

Quotes by Writers of fame:

- ➢ Death is the golden key that opens the palace of Eternity. (Milton).
- ➢ Dim funeral candles are heaven's distant lamps. (Longfellow).
- ➢ When my heart is sky-bound, the shadow of my body lies here. (Kepler)
- ➢ There is no pain as great as the memory of grief. (Aeschylus)
- ➢ The best portion of a good man's life lives outside the grave. (Wordsworth)
- ➢ Heaven is the treasury of everlasting joy. (Shakespeare)
- ➢ When you are sad, search for joy. (Gibran)
- ➢ The heart of man is restless until he finds rest in God. (St. Augustin)
- ➢ What you seek is seeking you. (Rumi)
- ➢ When soft voices of joy die, they vibrate in the memory. (Shelley)
- ➢ We die to live in Eternity's sunrise. (William Blake)
- ➢ We're like butterflies that see few summer days. (Keats)
- ➢ God's garden needs flowers and so you are gone there. (Byron)
- ➢ Earth has to borrow that God cannot heel. (Alexander Pope)

Epitaphs as Literary Ornaments

Epitaphs are ornaments adorning the neck of the Goddess of Literature. They are rich in literary elegance emanating the celestial fragrance of literary flavour. Some Epitaphs are like miracles that keep the eyes open to see only the good, hear the better and do the best.

Epitaphs coined by Giants of Literature are like Classics of Literature. They excel in the art of counseling and in putting the passer by on the path of nobility and reality. Death is certain but some have conquered it by planting the banners of popularity with their good deeds. They were like candles burning bright and filling the world with

the brilliance of kindness, charity and fraternal excellence. They had disproved the doctrine that l end of all. They had redefined Death as the harbinger of new life. They had withstood the test of times by putting up a tryst with destiny to prove that man is superior to all creatures. These stones are not just pieces of rock but are towers proclaiming eternal truths. They are like rocky trumpets voicing out the melody of birth and death. They are certainly the stone-bugles blowing out the realities of existence and the purpose of life. A well-worded Epithet is like a well orchestrated musical extravaganza that thrills the heart and delights the soul.

Headstone Epitaphs not only commemorate the dead but also stand as verbal Testimonials of his ace-qualities, abilities, ambitions, aspirations and achievements.

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SPACE SAVING FURNITURE AS A SMART SOLUTION FOR 2BHK APARTMENTS

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Abstract

Urbanization growth and marketing prices compel citizens into less space, due to increase in population the appearance of small flats and houses came into being. In cities many people live in small flats and homes. Many apartments fail to provide spaces with quality and comfort. Growing migration to cities leads to the growing of vertical housings and small apartments. Therefore, living in a small space necessitates minimalist and space-saving furniture solutions to sustain human wellbeing. This necessitates the amendment in space saving furniture solutions which gives full advantage of these reduced spaces while still achieving greater comfort, usability, and order in these spaces.

This research paper contributes to the factors that influence the purchase of space saving furniture on the space efficiency of apartments, through a survey that was conducted randomly among 500 respondents residing in apartments in Tirupur and Coimbatore through purposive sampling technique. This study finds that most participants have difficulties with their small spaces and supported the idea that space saving furniture can be a smart solution for their problems.

Key Words : Minimal Space, Furniture, apartments, 2bhk apartments.

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1.1 INTRODUCTION

In India there is a domination of middle class people and owning a own house seems impossible. It is also a known fact that majority of middle class people live in cities. These cities face problems with continuous population growth, but human desires and wants are unlimited. Urbanization growth and marketing prices

compel citizens into less space, due to increase in population the appearance of small flats and houses came into being. In cities many people live in small flats and homes. Many apartments fail to provide spaces with quality and comfort. Growing migration to cities leads to the growing of vertical housings and small apartments.

Therefore, living in a small space necessitates minimalist and space-saving furniture solutions to sustain human wellbeing. This necessitates the amendment in space saving furniture solutions which gives full advantage of these reduced spaces while still achieving greater comfort, usability, and order in these spaces.

This research paper contributes to the factors that influence the purchase of space saving furniture on the space efficiency of apartments, through a survey that was conducted randomly among 500 respondents residing in apartments in Tirupur and Coimbatore through purposive sampling technique. This study finds that most participants have difficulties with their small spaces and supported the idea that space saving furniture can be a smart solution for their problems. Since furniture is a duty and a luxury, everyone needs it. Furniture occupies a lot of space and causes a lot of irregularity and wasted spaces. Space saving furniture as a flexible method can increase space sustainability and improve the quality of living by serving several functions at once. These types of flexible furniture can balance spaces in terms of beauty and efficiency.

1.2 REVIEW OF LITERATURE

Kristoffer Thogersen (2016), in his study pointed out that, a significant connection between furniture, small apartments and human wellbeing, as well as the physical surrounding in an apartment having a large impact on its residents. With these two factors in mind when designing furniture for an apartment, the result could end up affecting human wellbeing in a positive way. Firstly: having a piece of furniture with more than one function is essential to save as much valuable space as possible. Secondly, the arrangement of the furniture could be used to affect the flow and feel of an apartment.

Oday Q. Abdulpader, Omar A. Sabah, and Hussein S. Abdullah (2014) in their study finds that flexibility in architectural design can solve the area problems and multi-use plan. It could provide many possibilities to change the shape and size of internal space in addition to the economic and social impacts on the housing system. The increase of moving from the rural and suburban to the main city offset router by new and creative designs and experiences that seek to solve the problems associated with immigration. Because of these necessary needs, designers have started new and creative ideas to design skyscrapers and multi-story buildings to cover the housing and economic needs. These solutions vary mechanism from one area to another mismatch of vertical buildings and use them depends on the reduced space. This research studies the possibilities of flexible designs and the impact on the efficiency of interior design in addition to the using of integrated serves to get a creative and sustainable design to make our city more livable.

1.3 STATEMENT OF THE PROBLEM

Most cities face problems with continuous population growth, while human needs remain the same or increase. Urbanization growth and marketing prices force citizens into less space. There is less restricted build up space especially in 2bhk apartments. The residents in these apartments face problems like less storage, minimum facilities, no zoning of spaces, less privacy and less psychological satisfaction. Therefore there is a

Thus, it is concluded that all the seven factors namely, Compact and Space Saving factors, Quality based factors, Price Based Factors, Style Based Factors, Psychological based factors, Stress based factors and Environment based factors. have significant impact on the purchase of space saving furniture at 5 percent level of significance.

1.8. CONCLUSION

Nowadays, people tend to move to metropolises for their greater employment opportunities and progressive lifestyles. This trend towards urbanization causes cities to have relatively less available free space, and also increases the price of their properties. People who live in large cities can only afford small apartments or condos. This provides a good opportunity for the development of space saving furniture. Space saving furniture is an innovative product that has much opportunity for future development, and a huge potential market in metropolises. Space saving furniture provides small properties with greater space and multiple functions. This paper explored the factors and the importance of space saving furniture in 2bhk apartments in Tirupur and Coimbatore districts.

Using 37 items, seven factors and a five-point scale, a purposive sampling survey of the factors influencing the purchase of Space saving furniture was conducted. Standard statistical processing of the generated data revealed a number of factors related to the purchase of Space saving furniture. The prominent factors are Compact and Space Saving factors, Quality based factors, Price Based Factors, Style Based Factors, Psychological based factors, Stress based factors and Environment based factors. Therefore it can be concluded that residents in 2bhk apartment prefer space saving furniture. Design and art should always be created based on the needs of the society and solve the issues to provide people a better living environment, that is why the multifunction furniture and product design needs more attention and development.

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ACADEMIC PERFORMANCE AND BEHAVIORAL CHANGE AMONG ONLINE CLASS ATTENDANTS - STUDY WITH REFERENCE TO DIGITAL EDUCATION

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Abstract:
COVID-19 Pandemic brought tremendous changes to the whole world. The people around the world had to transform all of a sudden to the digital era. College students had the opportunity to continue their learning from remote areas. Managing technology is even more crucial as basic skills required in navigating day-to-day life. Every innovation has pros and cons but the learners have to be brave and cautious in adapting them effectively. The Post COVID-19 had brought difference in the attitude and behavior in College Students. The aims of the study are to find out the level of Academic Performance (AP) of students who attended online classes during and after COVID-19, analyze the Behavioral Change (BC) among the students who attended the Online Classes, to find out the whether the students have had Opportunity (OP) to gain knowledge and enhance their skills. The data were collected through structured questionnaire using Google Form from 276 College Students. It has been found that E-learning has been a support to teaching-learning process by providing customizable materials for teachers and learners in new forms such as MOOC, OER, and Educational Apps which potentially make education available to anyone, anywhere, at any time.

Keywords: *COVID-19 Pandemic, Digital Technology, Digital Education, Behavioral Change, Innovation, Post COVID-19, Academic Performance, Opportunity.*

Introduction

Education is sometimes perceived as a sector which is resistant to change, while at the same time it faces a crisis of productivity and efficiency [7].education is perceived in most countries as a means of enhancing equity and equality. Innovations could help enhance equity in the access to and use of education, as well as equality in learning outcomes [7]. Technology-based innovations in education reshape the environments in which colleges operate. In general, they tend to open up learning environments, both to the digital world and the physical and social environment [7].

Statement of the problem

Education sector could foster an innovation-friendly environment, with a greater focus on methods over technologies [7]. Despite the many challenges involved in integrating technology in teaching and learning, digital technology offered a great opportunity for education during covid-19 pandemic [7]. The classrooms were shifted to digital mode supported by quality teaching-learning and student engagement through collaborative workspaces, remote and virtual labs. Many ict tools help connect learning to authentic, real-life challenges [7]. Hence, this study was undertaken to know whether the digital technology based education has rescued the students or changed the attitude and behavior of the college students.

Objectives of the study

1. To examine the level of academic performance (ap) of students who attended online classes during and after covid-19.
2. To analyze the behavioral change (bc) among the students who attended the online classes.
3. To know whether the students had an opportunity (op) to gain knowledge and enhance their skills.

Research gap

Articles relating to online education were extensively reviewed. Most of the studies were related to the improvements of student learning outcomes, development of higher-order thinking skills, preference and satisfaction of online education, and expand the range of learning

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opportunities available to students using ict tools. No specific study has been carried out to analyze the attitude and behavioral changes of the college students through online education. Hence, the present study was undertaken.

Review of literature

Sabah, nasser. (2013) investigated the impact of four learning approaches: face-to-face learning, blending learning, virtual classrooms and video streaming by students at alquds open university. We explore the students' attitudes, motivations and expectations towards e-learning. Also, realistic implications to incorporate e-learning model and their impacts on the teaching and learning process were included. The collected results show that students appreciate and favor the blending of e-learning and face-to-face learning. E-learning is more efficient when the whole learning and teaching approach is applied. The paper induces that e-learning should be incorporated as part of the whole learning approach in which technology is one of the integrated tools that enhances the learning quality [1]. Hunt, a., &tickner, s. (2015) "online pedagogies based on sociocultural methods require openness to difference, understanding, and sharing; but it is a challenge to support productive learning communities that span diverse cultural backgrounds. The survey was trialed with 112 students and four lecturers in 11 online teacher education courses offered by a new zealand university. Although respondents exhibited a wide range of choice in the survey, the participants were not sufficiently diverse to reveal any differences that might be attributed to culture. It was concluded that the cultural dimensions of learning framework could provide a useful stimulus to promote discussion amongst learners and teachers and that this discussion could raise awareness of the diversity of approaches to learning that could have a cultural basis" [2]. Suner, a. Et.al., 2019 "evaluated usage habits, attitudes and perceptions towards mobile learning (m-learning), as well as to identify variables related to those attitudes amongst undergraduate dental students. The dental students have generally positive attitudes towards m-learning. Students raise awareness towards the promise of m-learning in order to apply their individual technology use and learning behaviours. Designing learning materials and applications for mobile devices may increase students' performances" [3]. Laura sbaffi& john bennett (2019) conducted a study to gain insights of students' experience of a jointly-taught, distance learning, part-time postgraduate programme. A mixed-methods approach involving an online survey and semi-structured interviews was adopted. The results show that students concentrated their perceptions on three main areas: the academic content of the programme, seen as current, interesting and relevant to their professional lives; delivery processes, including the advantages of the flexibility and tailored approach and the disadvantages of being exposed to different teaching styles and lack of face to face interaction; the administrative and practical aspects, accounting for the majority of complaints due to the discrepancies across the two schools responsible for the delivery of the programme. Differences in experience emerged depending on gender and year of enrolment [4]. Hawley, s. R., et al., 2021 "the covid-19 pandemic has altered the landscape of higher education, forcing institutes across the globe to lock down campuses and shift instructional methods. To determine the impact of these changes on students, the author collected qualitative information about the pandemic-related concerns of higher education students across multiple countries and continents. Major areas of concern included education, safety of others and self, mental health, financial and employment instability, uncertainty about the future, and the pandemic's impact on relationships. The results of this study provide broadly endorsed international information on student needs for support and continuity of learning. Overall, student feedback about concerns can guide institutes of higher education in better supporting students during the covid-19 pandemic, as well as other emergencies that require a modification of usual learning methods [5]. Hargitai, d. M. Et al., 2021 "investigated about the students' pre-epidemic learning habits, their use of communication tools and their preferences for solutions usable in distance education, with a special focus on gender and education level. An important contribution to knowledge management studies by addressing the lessons that universities should learn and translate into managerial frameworks after the usage of extensive e-learning systems as a result of the covid-19 pandemic, and adds to existing research on business students' learning preferences and habits with respect to the influence of the internet. The author explored that the relationship between knowledge management and e-learning in the case of universities, can be used for future academic studies as well as to make practical

improvements and develop a culture and processes that promote and implement concrete km measures and actions after the covid-19 pandemic in universities with respect to students' opinions regarding e-learning and, more generally, learning habits [6].

Research methodology: convenient sampling method was applied to collect the data from 276 students belonging to arts and science college and diploma college of vellore district. Structured questionnaire using google form circulated to the college students. The secondary data was collected from journals, magazines, newspaper, books, websites etc. The analysis used for the proposed hypothesis was factor analysis and sem model.

Data analyses & interpretations

Demographic profile: table 1 outlines the details of the respondents selected for the study. Majority of them are male (72%), 18 to 20 years of age (68%), belong to rural area (65%), pursuing graduation programme (65%), in the second year (63%), mostly attended classes in the online mode (92%) during and post covid-19.

Table 1: respondent demography

Demography	Category	Frequency	Percent
Gender	Male	198	71.7
	Female	78	28.3
Age	18-20	188	68.1
	20-22	59	21.4
	22-24	29	10.5
Geography	Rural	178	64.5
	Semi-urban	42	15.2
	Urban	56	20.3
Education	Diploma	25	9.1
	Graduation	179	64.9
	Post graduation	67	24.3
	Others	5	1.8
Level	I year	42	15.2
	Ii year	173	62.7
	Iii year	57	20.7
	Iv year	4	1.4
Online class	No	9	3.3
	Sometimes	13	4.7
	Yes	254	92
	Total	**276**	**100**

Reliability analysis

Table 2 elucidated the cronbach alpha which help to find out the reliability of scale and validity of items. The table reveals that the reliability statistics for 24 items was 0.953 indicating high reliability and most suitable for the analysis.

Table 2: reliability and validity

Item	No. Of items	Mean	Variance	Std. Deviation	Cronbach's alpha
Abc	24	92.84	280.997	16.763	0.953

Source: computed

Factor analysis

Table 3 reflected that the value of kmo for 24 items was 0.949 which clearly states that the sample taken to process factor analysis was statistically reliable and valid.

Table 3: factorial validity by kmo and bartlett's test

Kmo and bartlett's test		
Kaiser-meyer-olkin measure of sampling adequacy.		.949
Bartlett's test of sphericity	Approx. Chi-square	5066.740
	Df	276
	Sig.	**.000**

Table 4 illustrates that after examining the reliability of scale and the appropriateness of data, the questionnaire about abc analysis was subjected to principle component factor analysis followed by varimax rotated factor analysis which yielded 3 factors. The solution was

obtained by using fixed number of factors. Accordingly 9 items were selected for factor dimension **academic performance**, 10 items for **behavioral changes** and 5 items for **opportunity**. The total variance explained for these 3 factors was 62.765%.

Table 4: loading of scale items on factors by rotated factor matrix

Factors	Component		
	1	2	3
Factor 1 – academic performance Attended classes regularly		.669	
Online classes were comfortable		.804	
Understood the subjects handled by teachers		.868	
Internet access were easy		.550	
Ability to clarify your doubts		.721	
Assignment & assessment were satisfactory		.760	
Ability to access the app's used for online classes		.733	
Utilization of time for online classes was appropriately used by me		.893	
Satisfied with online semester exams		.610	
Factor 2 – behavioural changes Communication skills	.839		
Time management	.742		
Understanding & grasping power of chapters	.753		
Reading and writing speed	.853		
Memorizing power	.793		
Physical & intellectual development	.830		
Extra-curricular activities	.739		
Moral values	.832		
Distraction by daily college routine	.775		
Addicted towards social networks	.683		
Factor 3 – opportunity Acquisition of new knowledge			.659
Enhanced my learning experience			.854
Online classes were convenient			.754
Quality of learning increased due to inclusion of all forms of ict tools			.849
Acquisition of ict tools for online classes were useful			.863
Extraction method: maximum likelihood. Rotation method: promax with kaiser normalization.[a]			
A. Rotation converged in 5 iterations.			

Factor correlation

Table 5 depicts that there is a high degree of correlation between the 3 factors of attitude and behavioural changes in college students post covid-19.

Table 5: correlation matrix

Factor correlation matrix			
Factor	**Academic performance**	**Behavioral changes**	**Opportunity**
Academic performance	1.000	.589	.557
Behavioral changes	.589	1.000	.650
Opportunity	.557	.650	1.000

Extraction method: maximum likelihood

Rotation method: promax with kaiser normalization.

Structural equation modelling: the sem model combines various analysis like factor, regression and simultaneous equation model. This helps to analyse the structural relationship between the variables. Table 6 illustrates the model fit summary indicating that cmin/df is 2.227/249 and the other variables in the model fit are also within the particular range. The model fit summary elicits that rmsea is 0.067 and pclose is 0.000; cfi is 0.938 and tli is 0.932; ifi is 0.939,

nfi is 0.894 and rfi is 0.883. Hence, it is revealed that the goodness of fit indices support the model fit and the structural model is said to be acceptable. All the co-variances among the variables and regression weights were statistically significant ($p < 0.001$).

Table 6 criterion for model fit

Criterion for goodness of fit model	Result
Cmin/df	2.227/249
P value	**0.000**
Root-mean squared error of approximation (rmsea)	**.067**
Pclose	**.000**
Tucker lewis index (tli)	**.932**
Incremental fit index (ifi)	**.939**
Comparative fit index (cfi)	**.938**
Nfi	**.894**
Rfi	**.883**

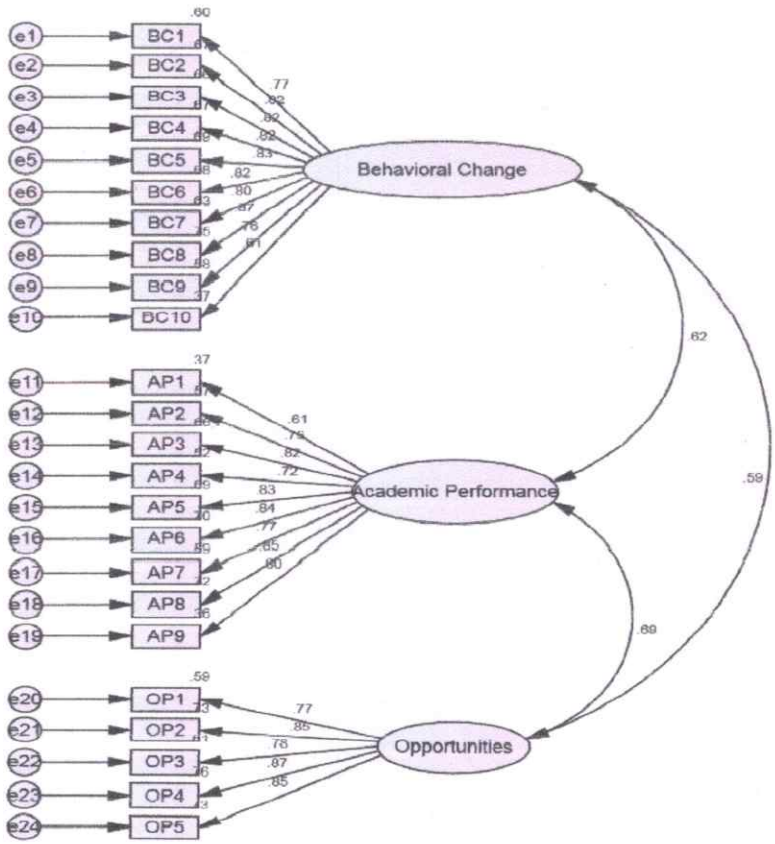

Figure 1 structural modeling (cfa)

Findings and implications

Based on the study, it is inferred that the students were satisfied with their academic performance wherein technological tools helped them to gain lot of insights in higher education. And also students feel that they had an opportunity to learn and develop new technologies such as learning analytics, enhancing skills and understanding for tomorrow's innovation societies. Every innovation has pros and cons. In such a way, students agree that these digital tools used for education has brought lot of changes in their attitude and behavior post covid-19. Students believe that changes have occurred in their communication skills, time management, lsrw, moral values, addicted towards social networks and so on [7]. E-learning has grown steadily in recent years as an option for higher education and is expected to expand progressively around the world [7]. From the student's perspective, online teaching-learning should be a part of curriculum in a positive and effective manner.

Conclusion

E-learning has been a support to teaching-learning process by providing customizable materials for teachers and learners in new forms such as mooc, oer, and educational apps which potentially make education available to anyone, anywhere, at any time. The successful integration of technology in education is not so much matter of choosing the right device, the right amount of time to spend with it, the best software or the right digital textbook. The key elements for success are the teachers, college management and other decision makers who have the vision, and the ability to make the connection between students, computers, mobiles and learning in a best possible manner [7].

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Whiteness and Democracy in Philip Roth's

I Married a Communist

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Abstract

Philip Roth is one of the most well-known and prolific writers in contemporary America, and *I Married A Communist* is the masterpiece of his reflections on American society at large. Set against McCarthyism in the 1950s, *I Married A Communist* displays Roth's contemplation of the relationships among Communism, whiteness and American democracy, and especially that between the latter two. Whiteness, based on racial differentiation and exclusion, exposes the inherent contradiction of American democracy. On the one hand, American democracy strives for equality, liberty and individual rights for all its citizens, but on the other hand, whiteness reveals various inequalities and injustices. To some extent, whiteness is complicit with American democracy, and Communism makes that complicity explicit.

Keywords

Philip Roth, *I Married a Communist*, Whiteness, Democracy.

1. Introduction

I Married A Communist, which was not penned in revenge for *Leaving A Doll's House: A Memoir*, is mainly about Ira Ringold's private life, which is closely entangled with the American political life of the 1950s. Compared with the other two works of the American Trilogy, which are *American Pastoral* (1997) and *The Human Stain* (2000), *I Married A Communist* has not sparked great interest in America or in China, although some American scholars are attracted by the background of the novel. Ross Posnock states that "the novel is meticulous and (largely) sympathetic portrayal of the enthrallingly sentimental, noble, and tawdry populist political culture of the forties and early fifties American Left,"

the social ladder through his hard work. Philip Roth has endowed Ira Ringold with individual has been cherished long in the United States, and the determination of self-transformation.

Ira's personal contradictions reflect the national contradictions between freedom of political beliefs and the witch-hunt McCarthyism which robs people of that freedom as well as the contradiction between racial equality and whiteness. Ira's new white identity is not stable at all, because when Eve Frame discovers that Ira has betrayed her and has had affairs with Sylphid's friend Pamela and also his masseuse, she discloses Ira's Communist affiliations in her ghost-written biography *I Married A Communist*. Ira Ringold is on the list of the House Un-American Activities Committee, which is supposed to investigate alleged disloyalty and subversive activities on the part of private citizens, public employees, etc. Communists are thought to be both disloyal and subversive, so anyone who is suspected of being a Soviet sympathizer or Communist will be investigated thoroughly.

4. Whiteness and Class Struggle

In Murray's hearing, the members of the House Un-American Activities Committee raise a series of questions like how can you be paid by the taxpayers' money when you are obliged by your damnable Communist oath to teach the Soviet line? How in God's name can you be a free agent and teach what the Communists dictate? Why don't you get out of the party and reverse your tracks? I plead with you-return to the American way of life!

The conflation of Communism and ethnic minorities has effectively blocked the overall joining of American working classes, and they who are organized by their respective unions have to struggle for their own benefits through non-violent means rather than aim to overturn the rule of the white Capitalists. Take Ira's union for example. Most often, the union meetings held regularly are mainly about "routine business like proposals for a new contract, the problem of absenteeism, a parking-lot beef, discussion of the looming war...racism, the wages-causes-prices myth." Another consequence of the conflation between Communism and ethnic minorities is that it convinces the working class that Communism is to solve racial problems, and the resolution of racial problems will enable ethnic and black workers to enjoy equal rights, which is bound to do harm to the interests of white workers. Abraham Lincoln, personated by Ira Ringold, is popular among ordinary people, and "Lincoln's" viewpoints of supporting price controls, condemning the Smith Act, and defending workers' rights seem to enjoy popular support, but Americans are unwilling to vote for Henry Wallace's Progressive Party which is supposed to be in line with "the founding ideals" upheld by Abraham Lincoln, mainly because the Progressive Party strives for equal rights between white and black.

5. Conclusions

Philip Roth integrates Ira Ringold into Rousseau and Thoreau's tradition of individuality by the two-room shack, and he also integrates Ira Ringold into the political forces of his time, which once again stresses the inseparability of individual and history. Everyone is both inside and outside the history of his time. Derek Parker Royal comments, "in American Trilogy, what he has done is to write the individual subject into the fabric of history, and in doing so he illustrates that identity is not only a product of, but also a hostage to, the many social, political, and cultural forces that surround it." Ira's construction of a new white identity is not only a product of the political forces, which require the participation of ethnic minorities or even black people to be in line with American democracy, but also a hostage to the same political forces, which are aimed at protecting the privileges for white people within American democracy.

I am opposed to negro citizenship in any and every form. I believe this governm[illegible]e on a white basis. I believe it was made for white men, for the benefit of white men, and their posterity forever I am in favor of confining citizenship to white men...instead of conferring it upon Negroes, Indians, and other inferior races."

The existence of racial problems not only negates American democracy, but also reveals that whiteness is actually in the nature of American democracy. Fundamentally, on the one hand, whiteness robs non-whites of their equal participation in national and public affairs, and on the other, whiteness splits the working class to eliminate the threat to the existing political system and Capitalism. Communism is the focus of the globe and American political arena, and McCarthyism consolidates the rule of whiteness in the name of anti-Communism. As a result, *I Married A Communist* is Philip Roth's reflection on that particular historical period and contemplation of whiteness and American democracy. Whiteness, which signals privileges, is inevitably in conflict with democracy, and the complicity between them has blocked America from becoming a democracy in real sense.

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Nutritional Content and Antioxidant Properties of Sapota (*Manilkara Achras* Forb.) Fruit Varieties

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ABSTRACT

Sapota is popular in a number of countries for its delicious, soft, sweet and luscious fruits. Although several varieties of sapota are under commercial cultivation in India, information on nutritional profiling of fruit and the associated health benefits have not been investigated. Hence, the present study was carried out to evaluate seven commercial varieties of sapota for their nutritional characteristics with a view to better exploit sapota fruits for their health benefits. A notable feature of the study was that the varieties Kalipati, Guthi and CO2 had significantly higher levels of the micro elements Fe, Cu and Zn respectively which could be exploited for treating mineral deficiency symptoms in human patients. The separation and identification of high levels of minerals and phytonutrients like, total phenol, total flavonoids, anthocyanins, fatty acids and free radical scavenging activity in fruit pulp showed that sapota fruit is nutritionally a rich fruit with many phytochemicals which are beneficial in both health and disease. The principal component analysis could successfully identify varieties with the largest amount of phytonutrients having specific health benefits.

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INTRODUCTION

Sapota (*Manilkara achras* Forb.), also known as sapodilla, is an evergreen tropical tree native to Central America. Sapota fruit is a brown colored berry ranging in diameter from 5-10 cm. The unripe fruit is hard and coarse while the mature ripe fruit is soft and juicy [1]. Sapota is a rich source of antioxidants and free radical scavenger due to the presence of phytochemicals [2]. India is one of the leading producers of sapota with a production of 11, 56,060 MT of fruit from an area of 97,000 ha under the crop during 2017-18 [3]. There are more than 35 cultivars of sapota under commercial cultivation in India [4]. With regard to chemical composition, large differences in ascorbic acid content have been reported between the Mexican and Indian varieties of sapodilla [5] and among sapota fruits at different ripening stages [6]. However, despite the increasing production, rising popular demand. High nutritive and medicinal values of sapota fruit, we do not have data on the composition of different commercially important varieties for various components related fruit quality. Hence, the present study was carried out on seven commercially important varieties of sapota and the results are presented and discussed in this paper.

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MATERIALS AND METHODS

Plant Material

The present study was conducted during 2019 on fruits collected from twenty-year-old sapota (*Manilkara achras*) trees (n = 15) of seven commercially important cultivars viz., Cricket Ball, PKM 4, Guthi, Kalipati, CO1, CO2 and PKM 5. Trees were maintained under standard agronomic practices at the experimental farm.

Biochemical Estimations

The total soluble solids (TSS) of fruit (°Brix) were measured by a refractometer. To determine the TSS of sapota fruits, their juice was extracted from the fruit and taken upon a glass slab. The TSS of fruits was recorded by visualizing clear cross marks inside the graduated scale of the refractometer. The moisture contents of fruit samples were determined gravimetrically. The pH of the fruit juices was measured by using a digital pH meter (RL060P, Thermo Electron Corporation, Singapore). 10 mL of the sapota fruit fresh juices was placed under the pH meter and waited for 1 min, then the pH of the juices was recorded. Distilled water was used as control.

The total lipid content of fruit samples was estimated by the gravimetric method [7]. 1g of dry powder was packed in a thimble and placed in a Soxhlet extractor using petroleum ether as solvent. The dissolved fat was evaporated in a boiling water bath. The amount of total fat was calculated and expressed as percentage fat content.

Reducing sugar was determined according to the method described by Miller [8]. 5g of fruit tissues were extracted by 80% (v/v) ethanol in a boiling water bath and centrifuged at 3000rpm for 10 min. at 25°C. The supernatant was evaporated dissolved in distilled water. 200 μL of supernatant was mixed with 800 μL of water and 500 μL of DNS reagent and kept on boiling water bath for 5 min. The volume was made up to 10 mL with distilled water. The absorbance was measured at 540 nm using a DU-64 spectrophotometer (Beckman Instruments Inc., Fullerton, CA, USA). The concentration of reducing sugars was calculated from a standard curve and expressed as g 100 g^{-1} FW tissue.

Total soluble sugar was estimated after acid hydrolysis of the supernatant. One mL of concentrated HCl was added to 10 ml of the extract, mixed, and incubated overnight at 37°C. The same mixture was neutralized with 10 N NaOH, using phenolphthalein as the indicator. The volume was made up to 10 mL with distilled water. 200 μL of supernatant was mixed with 800 μL of water and 500 μL of DNS reagent and kept on boiling water bath for 5 min. The volume was made up to 10 mL with distilled water. The absorbance was measured at 540 and the concentration of reducing sugars was calculated from a standard curve and expressed as g 100 g^{-1} FW tissue.

Starch was measured spectrophotometrically at 540 nm [8]. After sugar analysis, the 80% (v/v) ethanol extraction insoluble residues were mixed with 6 mL of 52% (v/v) perchloric acid. The mixture was incubated at 0°C for 10 min and centrifuged at 3000rpm for 5 min. at room temperature. The supernatant was acid hydrolyzed and analyzed as described above for total sugar. Starch concentrations were expressed in mg g^{-1} DW.

The total phenolic compounds of the fruit samples were determined by the Folin-Ciocalteu method [9]. The fruit samples were extracted using 80% (v/v) methanol and the supernatant was collected. 0.5 mL of the extract or gallic acid (standard) or 80% (v/v) methanol (control) was mixed with Folin-Ciocalteu reagent and mixed well. Then 5 mL of 1M sodium carbonate solution was added and kept for 15 min at room temperature. The concentration of total phenols was measured by using a spectrophotometer at 700 nm and expressed as mg 100g^{-1} FW of fruit tissue.

The total flavonoid content of sapota fruit samples was determined with Aluminium chloride ($AlCl_3$) according to Kim et al. [10]. One mL of 80% methanol extract of samples were mixed with 0.3ml of 5% $NaNO_2$ and 10% $AlCl_3$ and kept at room temperature for 5 min.

After the incubation, 4 mL of 1M NaOH was added to this mixture and measured at 510 nm. Methanol was used as a blank and the standard curve was prepared with catechin. The amount of total flavonoids was expressed as mg 100^{-1} FW of samples.

The 2,2-diphenyl-l-picrylhydrazyl(DPPH) free radical scavenging activity of sapota fruit extract and ascorbic acid was measured according to Brand Williams et al. [11] with some modifications. The fruit pulp was extracted with 80% (v/v) methanol and the supernatant was used as the test sample. 0.2 mL of sample extract was added to 0.3mL of 10 mM acetate buffer (pH 5.4) and 2.5mL of DPPH solution in methanol. The mixture was kept at room temperature for 30 min and the absorbance was measured at 517 nm. The scavenging activity of the fruit extract was expressed as mg 100g^{-1} FW of the sample.

The ferric reducing antioxidant power (FRAP) of the fruit extracts and standards were determined by the method described by Benzie and Strain [12].

Ascorbic acid was used as standard. The 80% (v/v) methanol extract (0.2 mL) was mixed with 1.8 mL of FRAP reagent (the mixture of, 25 mL of sodium acetate buffer (pH 3.6), 2.5 mL of 10mM 2,4,6-tripyridyl-s-triazine (TPTZ) solution in acidic methanol, and 2.5 mL of 20 mM $FeCl_3$). After 15 min, the absorbance was measured at 593 nm. The ferric reducing power of the extract was expressed as mg $100g^{-1}$ FW of the sample.

Total carotenoids in the samples were estimated by saponification [13]. To 25 mL of the hexane extract in a separating funnel, 5 mL of alcoholic KOH was added, mixed well, and allowed to stand for at least 30 min. The hexane layer was washed repeatedly with water to remove KOH completely. Traces of residual moisture were removed by adding Na_2SO_4 powder and the final volume made up to 25 mL with hexane and absorbance was read at 470 nm. Carotene content was calculated by referring to the standard curve prepared from β-carotene and expressed as $mg100g^{-1}FW$.

The determination of ascorbic acid present in sapota fruit pulp was done by the method of Simona et al. [14] with some modifications. The fruit pulp was extracted with 0.4% oxalic acid and the supernatant was collected. One mL of the extract was mixed with 2mL of 2,6-Dichlorophenol indophenol (DCPIP) dye (the mixture of 24 mg of DCPIP and 21mg of Na_2HCO_3 in distilled water made up the volume of 200 mL). The optical density of the solution was read at 520 nm immediately after mixing the reagent. The concentration of ascorbic acid was expressed as mg $100g^{-1}$ FW of the sample. Total anthocyanin was estimated according to the method of Fuleki and Francis [15]. Sapota fruit pulp was extracted with acidic methanol (methanol: acid, 99:1 ratio) and the homogenate was used as the test sample. The absorbance of the sample was measured at 540 nm. The standard curve was developed with cyaniding hydrochloride and the level of anthocyanin present in the sample was expressed as mg $100g^{-1}$ FW. Analysis of mineral nutrients present in the fruit sample was done with an oven-dried pulp sample. Freshly harvested fruits were ripened and the pulp was dried at 70°C in the oven. The dry samples were ground and used for mineral analysis. Nitrogen was estimated by titration after concentrated sulfuric acid digestion [16]. For other macro elements, one g of dry powder was digested with a nitric acid and perchloric acid (9:4) mixture. The analyses of micronutrients were estimated according to Jones Jr et al. [17].

Statistical Analysis

The results were expressed as mean ± SEM and determined in triplicate. The variation among varieties was measured by analysis of variance (ANOVA) using MSTAT-C software [18]. The principal component analysis (PCA) was performed to identify the major compounds present among varieties and was used to produce 2D plots [19].

RESULTS AND DISCUSSION

Principal component analysis of fruit quality parameters showed distinct differences among varieties as revealed by the spread of scores for individual samples along the PC1axis. Thus, the application of PCA technique to establish the variables that contributed most to the differences among groups was clearly evident in identifying the promising varieties for specific health benefits (Figure 1).

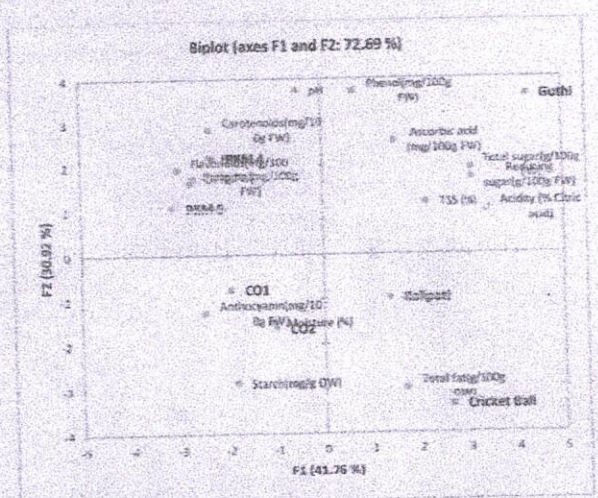


Figure 1: Principal Component Analysis of Fruit Components in Sapota Varieties

Fruit Composition

Among the seven varieties of sapota analyzed in this study, Guthi had the highest levels of TSS (23.0%), total sugars (16.32%), reducing sugars (9.35%), ascorbic acid (12.25 mg%) and total phenol (30.64mg%) (Figure 2), acidity (0.21%) (Figure 3). Total soluble solids (*TSS*) comprising of carbohydrates, proteins, fats, organic acids and minerals is an indicator of fruit sweetness. A TSS value ranging from 17.0-23.4 among the seven varieties of sapota was found to be relatively higher compared to many other fruits [20]. Guthi had a higher sugar/acid ratio of 77.7 compared to others which is a desirable attribute as it is a primary indicator of flavor quality [21].

Antioxidants

The level of total phenol was also higher in Guthi (Figure 2). Phenolic acids are known to bestow

many health benefits due to their multiple actions such as antioxidant, anti-mutagenic, and scavenging activity on free radicals which help in prevention of cancer and cardiovascular diseases [22]. PKM-4 exhibited the highest levels of DPPH (50.45) and FRAP (20.04) which represent a distinctly higher antioxidant capacity compared to other varieties (Figure 2). A noteworthy aspect was that the Cricket ball variety had a significantly higher content of total fat (4.65%) while its close second CO2 had 3.60% fat (Figure 2). Incidentally, sapota cv. Cricket ball is known to have a unique pulp texture. The highest level of anthocyanin (1.46 mg) (Figure 3) and protein (361.2 mg %) was found in CO1 (Figure 4). Anthocyanins are known to provide many health benefits by protecting cells from free radical damage. They are also helpful in bolstering the immune system and combating premature aging [23]. PKM 5 showed the highest contents of flavonoids (5.90 mg) (Figure 2), carotenoids (0.457mg) (Figure 3), and starch (Figure 4). Consumption of fruits with high carotenoids is known to increase the immunity in our body and reduce the risk of cancer, type II diabetes, and cardiovascular problems [24]. Flavonoids, carotenoids, anthocyanins, contribute to the vibrant color of fruits and are established their more antioxidant activity and anti-inflammatory action [25]. Besides, flavonoids are preferentially oxidized in our body and in doing so, prevent the oxidation of water-soluble antioxidants like ascorbic acid [26]. Thus, flavonoids prevent chronic oxidative stress and reduce free radical damage and inflammation [27] thereby lowering the risk of certain cancers. Flavonoids are reported to inhibit hyaluronidase activity which helps in maintaining the proteoglycans of connective tissues and thus prevent tumor metastases and the spread of bacteria [28].

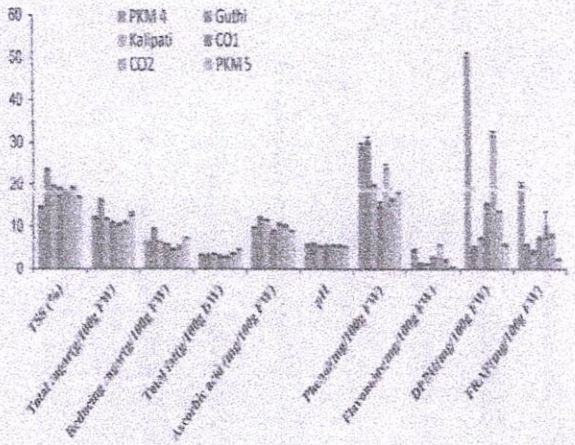


Figure 2: Proximate composition of sapota fruit varieties. Bars represent standard error of three independent replicates. The significance was considered at $p < 0.05$

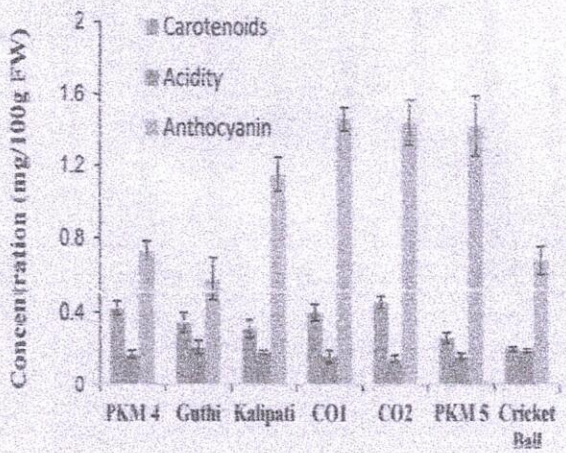


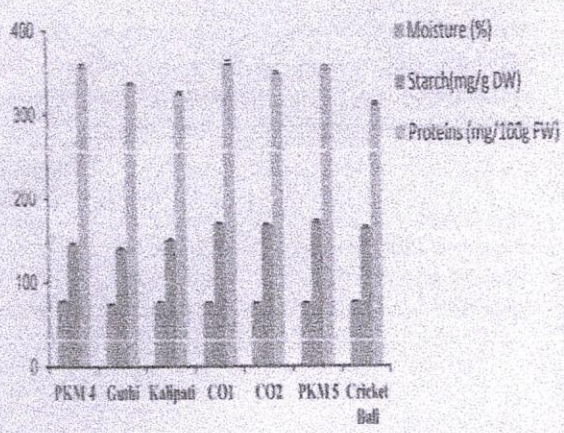
Figure 3: Level of carotenoids, acidity and anthocyanins present in sapota fruit varieties. Bars represent standard error of three independent replicates. Values are significantly different at $p < 0.05$

Mineral Elements

There were significant differences in the concentrations of mineral elements of pulp among the seven varieties. PKM5 had the highest levels of Zn while CO2 showed the highest levels of Ca and Mg (Figure 5 A, B). Kalipati had the highest level of K while PKM4 had the highest level of N. The concentrations of P, Ca and Mg in pulp were present at higher in PKM5 while K and Mn were higher in Kalipati (Figure 5 A, B).

The concentration of Cu was significantly higher in Guthi (3mg) compared to others while PKM5 had significantly higher level of Zn (12.3 mg). Cu is necessary for the production of hemoglobin, myelin, melanin and plays a vital role in the normal functioning of thyroid gland.

As per the recommendation of the National Institute of Health, USA, the daily requirement of Zn for an average adult male and female is 11 mg and 8 mg respectively [29]. Zinc acts as a cofactor for many enzymes [30] and is thereby involved in several important functions in the body such as transporting vitamin A, wound healing and perception of smell and taste. In view of the critical importance of the ratio of copper to zinc in human health, Osredkar and Sustar [31] have suggested supplementing the body with Cu and Zn as a means to prevent the onset of diseases.



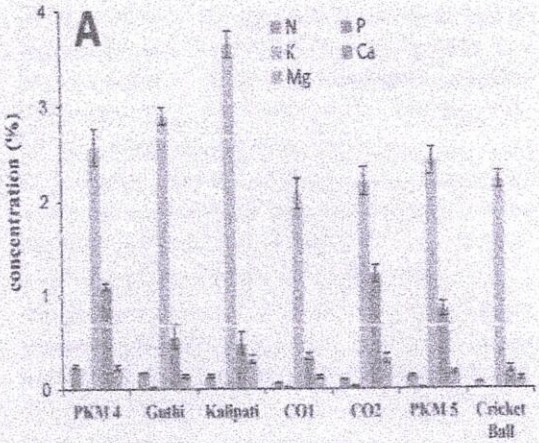


Figure 4: Level of moisture, starch and proteins present in sapota fruit varieties. Bars represent standard error of three independent replicates. Values are significantly different at $p < 0.05$

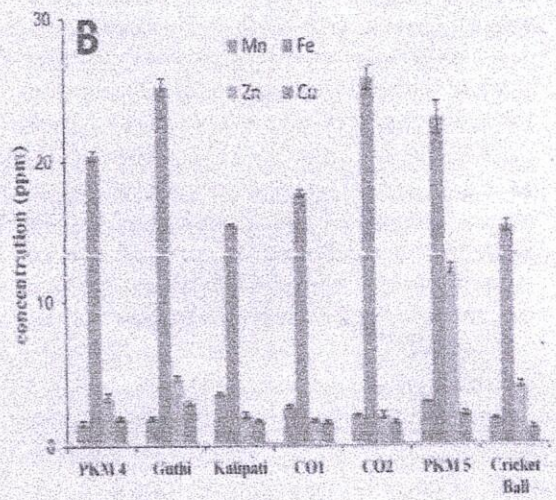


Figure 5: Mineral composition of pulp in sapota fruit varieties. Bars represent standard error of three independent replicates. Values are significantly different at $p < 0.05$

Since high levels of Cu and Zn are naturally present in Guthi, regular consumption of Guthi sapota fruit could be recommended to meet the daily requirement of the two trace elements so essential for health.

The Fe content in pulp was significantly higher in CO2 (25.8mg/100g) followed by Guthi (25.2mg/100g) and PKM5 (23.0mg/100g) (Figure 5B). These levels are much higher compared to banana [32]. The ascorbic acid level in Guthi was also significantly higher. In India, Fe deficiency is common among rural children and women. Pregnant women, especially need the highest amount of iron @ 27 mg a day [33].

Since Fe is essential for the synthesis of hemoglobin which facilitates the transport of oxygen *via* red blood cells, a deficiency of Fe leads to chronic weakness and fatigue. In such cases, the consumption of sapota fruit of PKM 5 or Guthi or CO2 could provide a simple remedy to overcome Fe deficiency symptoms. A notable characteristic is that the ascorbic acid content is also high in Guthi which is essential for the uptake of Fe by the body [34].

Thus, the higher contents of both Fe and ascorbic acid in Guthi variety makes it ideal for treating anemia in patients, especially pregnant women. Calcium, magnesium and potassium, are the important growth elements which maintain the bone, teeth and muscle in our body. The high intake of calcium is recommended for women particularly during pregnancy [35] while magnesium is considered to be the best source for cardiac and nerve function.

CONCLUSION

The application of metabolomics coupled with PCA technique to establish the variables that contributed most to the differences among varieties was clearly evident from the study. The study showed that large differences exist among sapota varieties for fruit biochemical components linked to nutritional and medicinal parameters. The most significant differences among varieties were found in the levels of mineral elements. PKM 5 and Guthi with over 25 mg Fe/100g could be potential sources to tackle iron deficiency symptoms in pregnant women and underprivileged children in rural areas of India and elsewhere. Guthi had the highest malic acid content @ 16.7 g/100g FW which might prove to be a boon to patients with chronic fatigue syndrome. Antioxidant capacity of PKM 4 was several times higher

than other varieties which make it the appropriate variety for preventing life style diseases. The differences in nutritional value among sapota varieties have great significance for commercial exploitation as health food.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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Certain Kinds of Bipolar Interval Valued Neutrosophic Graphs

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Abstract

Neutrosophic theory has several application in the field of graph theory. In this paper we initiated Certain Kinds of Bipolar interval valued nentrosphic graphs. Such as, sub divsicon BIVNG, Total BIVNG, BIVNLG and also investigate the isomorphism, Coweak isomorphism of BIVNG with properties .
Keywords: Isomorphism, Co weak isomorphism, total, subdivision BIVNG

1 Introduction

The idea of Neutrosophic set is the generalised form of fuzz set concepts [1]. Atanassov introduced the concept that is intuitionistic fuzzy graphs [2] and Akram. et al. given the new concept single valued neutrosophic hypergraphs, planer graphs [3] [4]. Broumi et al introduced, single Valued neutrosophc graphs. [5][6][7]. V.J. Sudhakar et al. Introduced the idea of IVSNG, IVRNG and SCIVN graphs [8][9][10].

2 Kinds of BIVNG

In this part we initiate the some special kinds of BIVNG. That is, subdivision, Total, Lined and intersection of BIVNG. So first we give the definition of Homomorphism, Isomorphism, weak isomorphism and co weak isomorphism of BIVNG.

Definition 2.1. If $G_1 = (R_1, S_1)$ and $G_2 = (R_2, S_2)$ be the two BIVNGs of $G_1^\bullet = (V_1, E_1)$ and $G_2^\bullet = (V_2, E_2)$, Then the homomorphism $\phi : G_1 \longrightarrow G_2$ is a mapping $\phi : V_1 \longrightarrow V_2$ which proves the following conditions.

$$
\begin{aligned}
&T^P_{R_1U}(m) \leq T^P_{R_2U}(\phi(m)),\ T^P_{R_1L}(m) \leq T^P_{R_2L}(\phi(m))\\
&I^P_{R_1U}(m) \geq I^P_{R_2U}(\phi(m)),\ I^P_{R_1L}(m) \geq I^P_{R_2L}(\phi(m))\\
&F^P_{R_1U}(m) \geq F^P_{R_2U}(\phi(m)),\ F^P_{R_1L}(m) \geq F^P_{R_2L}(\phi(m))\\
&T^N_{R_1U}(m) \geq T^N_{R_2U}(\phi(m)),\ T^N_{R_1L}(m) \geq T^N_{R_2L}(\phi(m))\\
&I^N_{R_1U}(m) \leq I^N_{R_2U}(\phi(m)),\ I^N_{R_1L}(m) \leq I^N_{R_2L}(\phi(m))\\
&F^N_{R_1U}(m) \leq F^N_{R_2U}(\phi(m)),\ F^N_{R_1L}(m) \leq F^N_{R_2L}(\phi(m)) \quad \forall\, m \in V_1.
\end{aligned}
$$

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$$
\begin{aligned}
T^P_{S_1U}(mn) &\leq T^P_{S_2U}(\phi(m)\phi(n)) \\
T^P_{S_1L}(mn) &\leq T^P_{S_2L}(\phi(m)\phi(n)) \\
I^P_{S_1U}(mn) &\geq I^P_{S_2U}(\phi(m)\phi(n)) \\
I^P_{S_1L}(mn) &\geq I^P_{S_2L}(\phi(m)\phi(n)) \\
F^P_{S_1U}(mn) &\geq F^P_{S_2U}(\phi(m)\phi(n)) \\
F^P_{S_1L}(mn) &\geq F^P_{S_2L}(\phi(m)\phi(n)) \\
T^N_{S_1U}(mn) &\geq T^N_{S_2U}(\phi(m)\phi(n)) \\
T^N_{S_1L}(mn) &\geq T^N_{S_2L}(\phi(m)\phi(n)) \\
I^N_{S_1U}(mn) &\leq I^N_{S_2U}(\phi(m)\phi(n)) \\
I^N_{S_1L}(mn) &\leq I^N_{S_2L}(\phi(m)\phi(n)) \\
F^N_{S_1U}(mn) &\leq F^N_{S_2U}(\phi(m)\phi(n)) \\
F^N_{S_1L}(mn) &\leq F^N_{S_2L}(\phi(m)\phi(n))
\end{aligned}
$$

for every $mn \in E_1$.

Definition 2.2. If $G_1 = (R_1, S_1)$ and $G_2 = (R_2, S_2)$ be the two BIVNGs of $G_1^* = (V_1, E_1)$ and $G_2^* = (V_2, E_2)$, Then the weak isomorphism $\omega : G_1 \longrightarrow G_2$ is a bijective mapping $\omega : V_1 \longrightarrow V_2$ which satisfies the following conditions.
Here ω is a homomorphism.

$$
\begin{aligned}
T^P_{R_1U}(m) &= T^P_{R_2U}(\omega(m)) \\
T^P_{R_1L}(m) &= T^P_{R_2L}(\omega(m)) \\
I^P_{R_1U}(m) &= I^P_{R_2U}(\omega(m)) \\
I^P_{R_1L}(m) &= I^P_{R_2L}(\omega(m)) \\
F^P_{R_1U}(m) &= F^P_{R_2U}(\omega(m)) \\
F^P_{R_1L}(m) &= F^P_{R_2L}(\omega(m)) \\
T^N_{R_1U}(m) &= T^N_{R_2U}(\omega(m)) \\
T^N_{R_1L}(m) &= T^N_{R_2L}(\omega(m)) \\
I^N_{R_1U}(m) &= I^N_{R_2U}(\omega(m)) \\
I^N_{R_1L}(m) &= I^N_{R_2L}(\omega(m)) \\
F^N_{R_1U}(m) &= F^N_{R_2U}(\omega(m)) \\
F^N_{R_1L}(m) &= F^N_{R_2L}(\omega(m))
\end{aligned}
$$

for every $m \in V_1$.

Definition 2.3. If $G_1 = (R_1, S_1)$ and $G_2 = (R_2, S_2)$ be the two BIVNGs of $G_1^* = (V_1, E_1)$ and $G_2^* = (V_2, E_2)$, Then the co-weak isomorphism $\zeta : G_1 \longrightarrow G_2$ is a bijective mapping $\zeta : V_1 \longrightarrow V_2$ it must satisfies the below conditions.

Here ζ is a homomorphism such that

$$
\begin{aligned}
T^P_{S_1U}(mn) &= T^P_{S_2U}(\zeta(m)\zeta(n)) \\
T^P_{S_1L}(mn) &= T^P_{S_2L}(\zeta(m)\zeta(n)) \\
I^P_{S_1U}(mn) &= I^P_{S_2U}(\zeta(m)\zeta(n)) \\
I^P_{S_1L}(mn) &= I^P_{S_2L}(\zeta(m)\zeta(n)) \\
F^P_{S_1U}(mn) &= F^P_{S_2U}(\zeta(m)\zeta(n)) \\
F^P_{S_1L}(mn) &= F^P_{S_2L}(\zeta(m)\zeta(n)) \\
T^N_{S_1U}(mn) &= T^N_{S_2U}(\zeta(m)\zeta(n)) \\
T^N_{S_1L}(mn) &= T^N_{S_2L}(\zeta(m)\zeta(n)) \\
I^N_{S_1U}(mn) &= I^N_{S_2U}(\zeta(m)\zeta(n)) \\
I^N_{S_1L}(mn) &= I^N_{S_2L}(\zeta(m)\zeta(n)) \\
F^N_{S_1U}(mn) &= F^N_{S_2U}(\zeta(m)\zeta(n)) \\
F^N_{S_1L}(mn) &= F^N_{S_2L}(\zeta(m)\zeta(n))
\end{aligned}
$$

for every $mn \in E_1$.

Definition 2.4. If $G_1 = (R_1, S_1)$ and $G_2 = (R_2, S_2)$ be the two BIVNGs of $G^*_1 = (V_1, E_1)$ and $G^*_2 = (V_2, E_2)$, Then the Isomorphism $\eta : G_1 \longrightarrow G_2$ is a bijective mapping $\eta : V_1 \longrightarrow V_2$ it must satisfy the following conditions.

$$
\begin{aligned}
T^P_{R_1U}(m) &= T^P_{R_2U}(\eta(m)) \\
T^P_{R_1L}(m) &= T^P_{R_2L}(\eta(m)) \\
I^P_{R_1U}(m) &= I^P_{R_2U}(\eta(m)) \\
I^P_{R_1L}(m) &= I^P_{R_2L}(\eta(m)) \\
F^P_{R_1U}(m) &= F^P_{R_2U}(\eta(m)) \\
F^P_{R_1L}(m) &= F^P_{R_2L}(\eta(m)) \\
T^N_{R_1U}(m) &= T^N_{R_2U}(\eta(m)) \\
T^N_{R_1L}(m) &= T^N_{R_2L}(\eta(m)) \\
I^N_{R_1U}(m) &= I^N_{R_2U}(\eta(m)) \\
I^N_{R_1L}(m) &= I^N_{R_2L}(\eta(m)) \\
F^N_{R_1U}(m) &= F^N_{R_2U}(\eta(m)) \\
F^N_{R_1L}(m) &= F^N_{R_2L}(\eta(m))
\end{aligned}
$$

for every $m \in V_1$.

$$
\begin{aligned}
T^P_{S_1U}(mn) &= T^P_{S_2U}(\eta(m)\eta(n)) \\
T^P_{S_1L}(mn) &= T^P_{S_2L}(\eta(m)\eta(n)) \\
I^P_{S_1U}(mn) &= I^P_{S_2U}(\eta(m)\eta(n)) \\
I^P_{S_1L}(mn) &= I^P_{S_2L}(\eta(m)\eta(n)) \\
F^P_{S_1U}(mn) &= F^P_{S_2U}(\eta(m)\eta(n)) \\
F^P_{S_1L}(mn) &= F^P_{S_2L}(\eta(m)\eta(n)) \\
T^N_{S_1U}(mn) &= T^N_{S_2U}(\eta(m)\eta(n)) \\
T^N_{S_1L}(mn) &= T^N_{S_2L}(\eta(m)\eta(n)) \\
I^N_{S_1U}(mn) &= I^N_{S_2U}(\eta(m)\eta(n)) \\
I^N_{S_1L}(mn) &= I^N_{S_2L}(\eta(m)\eta(n)) \\
F^N_{S_1U}(mn) &= F^N_{S_2U}(\eta(m)\eta(n)) \\
F^N_{S_1L}(mn) &= F^N_{S_2L}(\eta(m)\eta(n))
\end{aligned}
$$

Definition 2.5. The sub division BIVNG be $S(G) = (R, S)$ of $G = (X, Y)$, where R is a BIVNS on $V \cup E$ and S is a BIVNR on R, then

(i) $R = X$ on V and $R = Y$ on E.

(ii) If $v \in V$ be on edge $e \in E$

Therefore, we have

$$\begin{aligned}
T^P_{SU}(ve) &= \text{Minimum } (T^P_{XU}(v), T^P_{YU}(e)) \\
T^P_{SL}(ve) &= \text{Minimum } (T^P_{XL}(v), T^P_{YL}(e)) \\
I^P_{SU}(ve) &= \text{Maximum } (I^P_{XU}(v), I^P_{YU}(e)) \\
I^P_{SL}(ve) &= \text{Maximum } (I^P_{XL}(v), I^P_{YL}(e)) \\
F^P_{SU}(ve) &= \text{Maximum } (F^P_{XU}(v), F^P_{YU}(e)) \\
F^P_{SL}(ve) &= \text{Maximum } (F^P_{XL}(v), F^P_{YL}(e)) \\
T^N_{SU}(ve) &= \text{Maximum } (T^N_{XU}(v), T^N_{YU}(e)) \\
T^N_{SL}(ve) &= \text{Maximum } (T^N_{XL}(v), T^N_{YL}(e)) \\
I^N_{SU}(ve) &= \text{Minimum } (I^N_{XU}(v), I^N_{YU}(e)) \\
I^N_{SL}(ve) &= \text{Minimum } (I^N_{XL}(v), I^N_{YL}(e)) \\
F^N_{SU}(ve) &= \text{Minimum } (F^N_{XU}(v), F^N_{YU}(e)) \\
F^N_{SL}(ve) &= \text{Minimum } (F^N_{XL}(v), F^N_{YL}(e))
\end{aligned}$$

else

$$S(ve) = 0 = (0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0)$$

Example 2.6. Let us consider the BIVNG $G = (X, Y)$ of a $G^* = (V, E)$ where $V = \{x, y, z\}$ and $E = \{i = xy, j = yz, k = zx\}$

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3 BIVNS - BIVNG

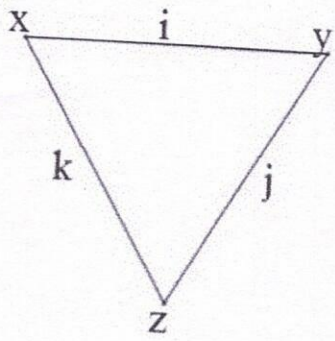

Figure 1: BIVNG

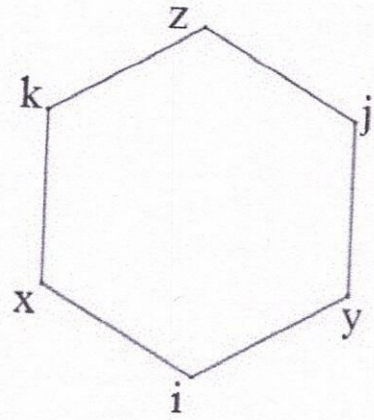

Figure 2: SDBIVNG

Table 1

	BIVNS-BIVNG											
X	T^P_{XU}	T^P_{XL}	I^P_{XU}	I^P_{XL}	F^P_{XU}	F^P_{XL}	T^N_{XU}	T^N_{XL}	I^N_{XU}	I^N_{XL}	F^N_{XU}	F^N_{XL}
x	0.1	0.1	0.3	0.4	0.1	0.1	-0.1	-0.4	-0.2	-0.1	-0.1	-0.5
y	0.2	0.3	0.4	0.5	0.2	0.5	-0.4	-0.6	-0.3	-0.5	-0.4	-0.7
z	0.3	0.7	0.5	0.2	0.5	0.2	-0.6	-0.1	-0.4	-0.2	-0.3	-0.8
Y	T^P_{YU}	T^P_{YL}	I^P_{YU}	I^P_{YL}	F^P_{YU}	F^P_{YL}	T^N_{YU}	T^N_{YL}	I^N_{YU}	I^N_{YL}	F^N_{YU}	F^N_{YL}
i	0.1	0.2	0.3	0.3	0.1	0.2	-0.2	-0.3	-0.1	-0.2	-0.2	-0.4
j	0.2	0.6	0.2	0.4	0.2	0.4	-0.3	-0.5	-0.3	-0.4	-0.3	-0.6
k	0.4	0.7	0.5	0.1	0.3	0.1	-0.5	-0.2	-0.2	-0.6	-0.1	-0.7

(i) The BIVNS X and Y are defined on V and E of a BIVNG G. The SDG is in Fig.2.

(ii) The BIVNS, R and S are defined in the Table 2.

Table 2

	BIVNS - SDBIVNG											
R	T^P_{RU}	T^P_{RL}	I^P_{RU}	I^P_{RL}	F^P_{RU}	F^P_{RU}	T^N_{RU}	T^N_{RL}	I^N_{RU}	I^N_{RL}	F^N_{RU}	F^N_{RU}
x	0.1	0.1	0.3	0.4	0.1	0.1	-0.1	-0.4	-0.2	-0.1	-0.1	-0.5
i	0.1	0.2	0.3	0.3	0.1	0.2	-0.2	-0.3	-0.1	-0.2	-0.2	-0.4
y	0.2	0.3	0.4	0.5	0.2	0.5	-0.4	-0.6	-0.3	-0.5	-0.4	-0.7
j	0.2	0.6	0.2	0.4	0.2	0.4	-0.3	-0.5	-0.3	-0.4	-0.3	-0.6
z	0.3	0.7	0.5	0.2	0.5	0.2	-0.6	-0.1	-0.4	-0.2	-0.3	-0.8
k	0.4	0.7	0.5	0.1	0.3	0.1	-0.5	-0.2	-0.2	-0.6	-0.1	-0.7
S	T^P_{SU} min	T^P_{SL} min	I^P_{SU} max	I^P_{SL} max	F^P_{SU} max	F^P_{SL} max	T^N_{SU} max	T^N_{SL} max	I^N_{SU} min	I^N_{SL} min	F^N_{SU} min	F^N_{SU} min
xi	0.1	0.1	0.3	0.4	0.1	0.2	-0.1	-0.3	-0.2	-0.2	-0.2	-0.5
iy	0.1	0.2	0.4	0.5	0.2	0.5	-0.2	-0.6	-0.3	-0.5	-0.4	-0.7
yj	0.2	0.3	0.4	0.5	0.2	0.5	-0.3	-0.5	-0.3	-0.5	-0.4	-0.7
jz	0.2	0.6	0.5	0.4	0.5	0.4	-0.3	-0.1	-0.4	-0.4	-0.5	-0.8
zk	0.3	0.7	0.5	0.2	0.5	0.2	-0.5	-0.1	-0.4	-0.6	-0.8	-0.8
kx	0.1	0.1	0.5	0.4	0.3	0.1	-0.1	-0.2	-0.2	-0.6	-0.1	-0.7

Definition 3.1. The Total BIVNG (TSBIVNG) is $T(G) = (R, S)$ of $G = (X, Y)$ where R is a BIVNS on $V \cup E$ and S is a BIVNR on R.
$\Rightarrow$ (i) $R = X$ on V and $S = Y$ on E.
(ii) If $v \in V$ lies on the edge $e \in E$, then

$$\begin{aligned}
T^P_{DU}(ve) &= \text{Minimum } \left(T^P_{XU}(v), T^P_{YU}(e)\right)\\
T^P_{DL}(ve) &= \text{Minimum } \left(T^P_{XL}(v), T^P_{YL}(e)\right)\\
I^P_{DU}(ve) &= \text{Maximum } \left(I^P_{XU}(v), I^P_{YU}(e)\right)\\
I^P_{DL}(ve) &= \text{Maximum } \left(I^P_{XL}(v), I^P_{YL}(e)\right)\\
F^P_{DU}(ve) &= \text{Maximum } \left(F^P_{XU}(v), F^P_{YU}(e)\right)\\
F^P_{DL}(ve) &= \text{Maximum } \left(F^P_{XL}(v), F^P_{YL}(e)\right)\\
T^N_{DU}(ve) &= \text{Maximum } \left(T^N_{XU}(v), T^N_{YU}(e)\right)\\
T^N_{DL}(ve) &= \text{Maximum } \left(T^N_{XL}(v), T^N_{YL}(e)\right)\\
I^N_{DU}(ve) &= \text{Minimum } \left(I^N_{XU}(v), I^N_{YU}(e)\right)\\
I^N_{DL}(ve) &= \text{Minimum } \left(I^N_{XL}(v), I^N_{YL}(e)\right)\\
F^N_{DU}(ve) &= \text{Minimum } \left(F^N_{XU}(v), F^N_{YU}(e)\right)\\
F^N_{DL}(ve) &= \text{Minimum } \left(F^N_{XL}(v), F^N_{YL}(e)\right)
\end{aligned}$$

else

$$S(ve) = 0 = (0,0,0,0,0,0,0,0,0,0,0,0)$$

(iii) Let γ, δ if $\gamma\delta \in E$ then

$$\begin{aligned}
T^P_{SU}(\gamma\delta) &= T^P_{YU}(\gamma\delta)\\
T^P_{SL}(\gamma\delta) &= T^P_{YL}(\gamma\delta)\\
I^P_{SU}(\gamma\delta) &= I^P_{YU}(\gamma\delta)\\
I^P_{SL}(\gamma\delta) &= I^P_{YL}(\gamma\delta)\\
F^P_{SU}(\gamma\delta) &= F^P_{YU}(\gamma\delta)\\
F^P_{SL}(\gamma\delta) &= F^P_{YL}(\gamma\delta)\\
T^N_{SU}(\gamma\delta) &= T^N_{YU}(\gamma\delta)\\
T^N_{SL}(\gamma\delta) &= T^N_{YL}(\gamma\delta)\\
I^N_{SU}(\gamma\delta) &= I^N_{YU}(\gamma\delta)\\
I^N_{SL}(\gamma\delta) &= I^N_{YL}(\gamma\delta)\\
F^N_{SU}(\gamma\delta) &= F^N_{YU}(\gamma\delta)\\
F^N_{SL}(\gamma\delta) &= F^N_{YL}(\gamma\delta)
\end{aligned}$$

If $gh \in E$, and it is a common vertex.

$$\begin{aligned}
T^P_{SU}(gh) &= \min\left(T^P_{YU}(g), T^P_{YU}(h)\right)\\
T^P_{SL}(gh) &= \min\left(T^P_{YL}(g), T^P_{YL}(h)\right)\\
I^P_{SU}(gh) &= \max\left(I^P_{YU}(g), I^P_{YU}(h)\right)\\
I^P_{SL}(gh) &= \max\left(I^P_{YL}(g), I^P_{YL}(h)\right)\\
F^P_{SU}(gh) &= \max\left(F^P_{YU}(g), F^P_{YU}(h)\right)\\
F^P_{SL}(gh) &= \max\left(F^P_{YL}(g), F^P_{YL}(h)\right)\\
T^N_{SU}(gh) &= \max\left(T^N_{YU}(g), T^N_{YU}(h)\right)\\
T^N_{SL}(gh) &= \max\left(T^N_{YL}(g), T^N_{YL}(h)\right)\\
I^N_{SU}(gh) &= \min\left(I^N_{YU}(g), I^N_{YU}(h)\right)\\
I^N_{SL}(gh) &= \min\left(I^N_{YL}(g), I^N_{YL}(h)\right)\\
F^N_{SU}(gh) &= \min\left(F^N_{YU}(g), F^N_{YU}(h)\right)
\end{aligned}$$

else

$$S(gh) = 0 = (0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0)$$

Example 3.2. By Example 2.6, The TBIVNG, $T(G) = (R, S)$

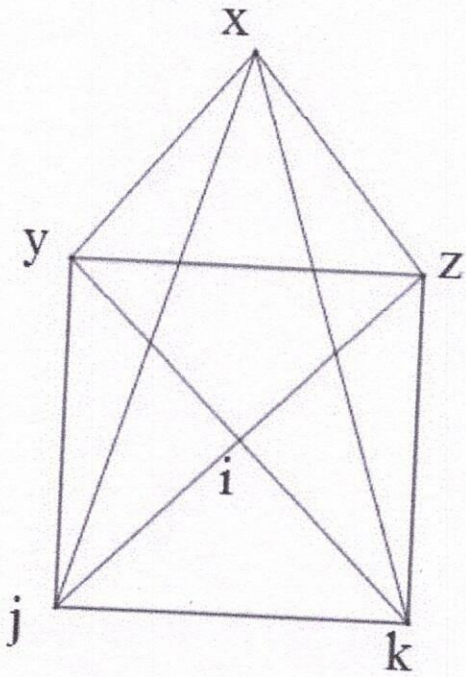

Figure 3: TBIVNG

Table 3

	TBIVNG											
S	T^P_{SU}	T^P_{SL}	I^P_{SU}	I^P_{SL}	F^P_{SU}	F^P_{SL}	T^N_{SU}	T^N_{SL}	I^N_{SU}	I^N_{SL}	F^N_{SU}	F^N_{SL}
xy	0.1	0.1	0.4	0.5	0.2	0.5	−0.1	−0.4	−0.3	−0.5	−0.4	−0.7
yz	0.2	0.3	0.5	0.5	0.5	0.5	−0.4	−0.1	−0.4	−0.5	−0.4	−0.8
zx	0.1	0.1	0.5	0.4	0.5	0.2	−0.1	−0.1	−0.4	−0.2	−0.3	−0.8
ij	0.1	0.2	0.3	0.4	0.2	0.4	−0.2	−0.3	−0.3	−0.4	−0.3	−0.6
jk	0.2	0.6	0.5	0.4	0.3	0.4	−0.3	−0.2	−0.3	−0.6	−0.3	−0.7
ki	0.1	0.1	0.5	0.3	0.3	0.2	−0.2	−0.2	−0.2	−0.6	−0.2	−0.7
xi	0.1	0.1	0.3	0.4	0.1	0.2	−0.1	−0.3	−0.2	−0.2	−0.2	−0.5
iy	0.1	0.2	0.4	0.5	0.2	0.5	−0.2	−0.3	−0.3	−0.5	−0.4	−0.7
yj	0.2	0.3	0.4	0.5	0.2	0.5	−0.3	−0.5	−0.3	−0.5	−0.4	−0.7
jz	0.2	0.6	0.5	0.4	0.5	0.4	−0.3	−0.1	−0.4	−0.4	−0.3	−0.8
zk	0.3	0.7	0.5	0.2	0.5	0.2	−0.5	−0.1	−0.4	−0.6	−0.3	−0.8
kx	0.1	0.1	0.5	0.4	0.3	0.1	−0.1	−0.2	−0.2	−0.6	−0.1	−0.7

Definition 3.3. Let $\mathcal{I} = (U, V)$ be the intersection graph of $G^\bullet$. Let R_1 and S_1 be the BIVNS on V and E respectively. R_2 and S_2 be the BIVNS on U and V. Then the bipolar interval valued neutrosophic intersection graph of BIVNG, $G = (R_1, S_1)$ is a BIVNG. $P(G) = (R_2, S_2)$.
⇒

$$T^P_{R_2U}(U_i) = T^P_{R_1U}(v_i)$$
$$T^P_{R_2L}(U_i) = T^P_{R_1L}(v_i)$$
$$T^N \quad (U_i) = T^N \quad (v_i)$$

$$
\begin{aligned}
I^P_{R_2U}(U_i) &= I^P_{R_1U}(v_i)\\
I^P_{R_2L}(U_i) &= I^P_{R_1L}(v_i)\\
I^N_{R_2U}(U_i) &= I^N_{R_1U}(v_i)\\
I^N_{R_2L}(U_i) &= I^N_{R_1L}(v_i)\\
F^P_{R_2U}(U_i) &= F^P_{R_1U}(v_i)\\
F^P_{R_2L}(U_i) &= F^P_{R_1L}(v_i)\\
F^N_{R_2U}(U_i) &= F^N_{R_1U}(v_i)\\
F^N_{R_2L}(U_i) &= F^N_{R_1L}(v_i)\\
T^P_{S_2U}(U_iU_j) &= T^P_{S_1U}(v_iv_j)\\
T^P_{S_2L}(U_iU_j) &= T^P_{S_1L}(v_iv_j)\\
T^N_{S_2U}(U_iU_j) &= T^N_{S_1U}(v_iv_j)\\
T^N_{S_2L}(U_iU_j) &= T^N_{S_1L}(v_iv_j)\\
I^P_{S_2U}(U_iU_j) &= I^P_{S_1U}(v_iv_j)\\
I^P_{S_2L}(U_iU_j) &= I^P_{S_1L}(v_iv_j)\\
I^N_{S_2U}(U_iU_j) &= I^N_{S_1U}(v_iv_j)\\
I^N_{S_2L}(U_iU_j) &= I^N_{S_1L}(v_iv_j)\\
F^P_{S_2U}(U_iU_j) &= F^P_{S_1U}(v_iv_j)\\
F^P_{S_2L}(U_iU_j) &= F^P_{S_1L}(v_iv_j)\\
F^N_{S_2U}(U_iU_j) &= F^N_{S_1U}(v_iv_j)\\
F^N_{S_2L}(U_iU_j) &= F^N_{S_1L}(v_iv_j)
\end{aligned}
$$

for every $U_i, U_j \in U$ and V.

Proposition 3.4. *Prove that BIVNIG is a BIVNG and also prove that BIVNG $\approx$ BIVNIG*

Proof. Let $G = (X_1, Y_1)$ is the BIVNG of $G^\bullet = (V, E)$ and take $P(G) = (X_2, Y_2)$ be a BIVNIG of $P(S)$. By the previous definition of BIVNIG, we write

$$
\begin{aligned}
T^P_{Y_2U}(m_im_j) &= T^P_{Y_1U}(v_iv_j)\\
&\leq \min\left(T^P_{X_1U}(v_i), T^P_{X_1U}(v_j)\right)\\
&= \min\left(T^P_{X_2U}(m_i), T^P_{X_2U}(m_j)\right)\\
T^P_{Y_2L}(m_im_j) &= T^P_{Y_1L}(v_iv_j)\\
&\leq \min\left(T^P_{X_1L}(v_i), T^P_{X_1L}(v_j)\right)\\
&= \min\left(T^P_{X_2L}(m_i), T^P_{X_2L}(m_j)\right)\\
T^N_{Y_2U}(m_im_j) &= T^N_{Y_1U}(v_iv_j)\\
&\geq \max\left(T^N_{X_1U}(v_i), T^N_{X_1U}(v_j)\right)\\
&= \max\left(T^N_{X_2U}(m_i), T^N_{X_2U}(m_j)\right)\\
T^N_{Y_2L}(m_im_j) &= T^N_{Y_1L}(v_iv_j)\\
&\geq \max\left(T^N_{X_1L}(v_i), T^N_{X_1L}(v_j)\right)\\
&= \max\left(T^N_{X_2L}(m_i), T^N_{X_2L}(m_j)\right)\\
I^P_{Y_2U}(m_im_j) &= I^P_{Y_1U}(v_iv_j)\\
&\geq \max\left(I^P_{X_1U}(v_i), I^P_{X_1U}(v_j)\right)\\
&= \max\left(I^P_{X_2U}(m_i), I^P_{X_2U}(m_j)\right)\\
I^P_{Y_2L}(m_im_j) &= I^P_{Y_1L}(v_iv_j)\\
&> \max\left(I^P_{X_1L}(v_i), I^P_{X_1L}(v_j)\right)
\end{aligned}
$$

$$
\begin{aligned}
I^N_{Y_2U}(m_im_j) &= I^N_{Y_1U}(v_iv_j)\\
&\le \min\left(I^N_{X_1U}(v_i), I^N_{X_1U}(v_j)\right)\\
&= \min\left(I^N_{X_2U}(m_i), I^N_{X_2U}(m_j)\right)\\
I^N_{Y_2L}(m_im_j) &= I^N_{Y_1L}(v_iv_j)\\
&\le \min\left(I^N_{X_1L}(v_i), I^N_{X_1L}(v_j)\right)\\
&= \min\left(I^N_{X_2L}(m_i), I^N_{X_2L}(m_j)\right)\\
F^P_{Y_2U}(m_im_j) &= F^P_{Y_1U}(v_iv_j)\\
&\ge \max\left(F^P_{X_1U}(v_i), F^P_{X_1U}(v_j)\right)\\
&= \max\left(F^P_{X_2U}(m_i), F^P_{X_2U}(m_j)\right)\\
F^P_{Y_2L}(m_im_j) &= F^P_{Y_1L}(v_iv_j)\\
&\ge \max\left(F^P_{X_1L}(v_i), F^P_{X_1L}(v_j)\right)\\
&= \max\left(F^P_{X_2L}(m_i), F^P_{X_2L}(m_j)\right)\\
F^N_{Y_2U}(m_im_j) &= F^N_{Y_1U}(v_iv_j)\\
&\le \min\left(F^N_{X_1U}(v_i), F^N_{X_1U}(v_j)\right)\\
&= \min\left(F^N_{X_2U}(m_i), F^N_{X_2U}(m_j)\right)\\
F^N_{Y_2L}(m_im_j) &= F^N_{Y_1L}(v_iv_j)\\
&\le \min\left(F^N_{X_1L}(v_i), F^N_{X_1L}(v_j)\right)\\
&= \min\left(F^N_{X_2L}(m_i), F^N_{X_2L}(m_j)\right)
\end{aligned}
$$

From the above we proved that the BIVNIG is a BIVNG.
Let us define the mapping $g : v \to m$ by $g(v_i) = m_i$, here $i = 1, 2, \ldots, n$.
The function g is clearly a bijective function $v_iv_j \in E$ iff $m_i, m_j \in T$

$$\Rightarrow \quad T = \{g(v_i)g(v_j);\ v_iv_j \in E\}$$

and

$$
\begin{aligned}
T^P_{X_2U}(g(v_i)) &= T^P_{X_2U}(m_i); & T^N_{X_2U}(g(v_i)) &= T^N_{X_2U}(m_i);\\
&= T^P_{X_1U}(v_i) & &= T^N_{X_1U}(v_i)\\
T^P_{X_2L}(g(v_i)) &= T^P_{X_2L}(m_i); & T^N_{X_2L}(g(v_i)) &= T^N_{X_2L}(m_i);\\
&= T^P_{X_1L}(v_i) & &= T^N_{X_1L}(v_i)\\
I^P_{X_2U}(g(v_i)) &= I^P_{X_2U}(m_i); & I^N_{X_2U}(g(v_i)) &= I^N_{X_2U}(m_i);\\
&= I^P_{X_1U}(v_i) & &= I^N_{X_1U}(v_i)\\
I^P_{X_2L}(g(v_i)) &= I^P_{X_2L}(m_i); & I^N_{X_2L}(g(v_i)) &= I^N_{X_2L}(m_i);\\
&= I^P_{X_1L}(v_i) & &= I^N_{X_1L}(v_i)\\
F^P_{X_2U}(g(v_i)) &= F^P_{X_2U}(m_i); & F^N_{X_2U}(g(v_i)) &= F^N_{X_2U}(m_i);\\
&= F^P_{X_1U}(v_i) & &= F^N_{X_1U}(v_i)\\
F^P_{X_2L}(g(v_i)) &= F^P_{X_2L}(m_i); & F^N_{X_2L}(g(v_i)) &= F^N_{X_2L}(m_i);\\
&= F^P_{X_1L}(v_i) & &= F^N_{X_1L}(v_i)
\end{aligned}
$$

for all $v_i \in V$.

$$
\begin{aligned}
T^P_{Y_2U}(g(v_i)g(v_j)) &= T^P_{Y_2U}(m_im_j); & T^N_{Y_2U}(g(v_i)g(v_j)) &= T^N_{Y_2U}(m_im_j)\\
&= T^P_{Y_1U}(v_iv_j) & &= T^N_{Y_1U}(v_iv_j)\\
T^P_{Y_2L}(g(v_i)g(v_j)) &= T^P_{Y_2L}(m_im_j); & T^N_{Y_2L}(g(v_i)g(v_j)) &= T^N_{Y_2L}(m_im_j)\\
&= T^P_{Y_1L}(v_iv_j) & &= T^N_{Y_1L}(v_iv_j)\\
I^P_{Y_2U}(g(v_i)g(v_j)) &= I^P_{Y_2U}(m_im_j); & I^N_{Y_2U}(g(v_i)g(v_j)) &= I^N_{Y_2U}(m_im_j)
\end{aligned}
$$

$$I^P_{Y_2L}(g(v_i)g(v_j)) = I^P_{Y_2L}(m_im_j); \quad I^N_{Y_2L}(g(v_i)g(v_j)) = I^N_{Y_2L}(m_im_j)$$
$$= I^P_{Y_1L}(v_iv_j) \qquad = I^N_{Y_1L}(v_iv_j)$$
$$F^P_{Y_2U}(g(v_i)g(v_j)) = F^P_{Y_2U}(m_im_j); \quad F^N_{Y_2U}(g(v_i)g(v_j)) = F^N_{Y_2U}(m_im_j);$$
$$= F^P_{Y_1U}(v_iv_j) \qquad = F^N_{Y_1U}(v_iv_j)$$
$$F^P_{Y_2L}(g(v_i)g(v_j)) = F^P_{Y_2L}(m_im_j); \quad F^N_{Y_2L}(g(v_i)g(v_j)) = F^N_{Y_2L}(m_im_j);$$
$$= F^P_{Y_1L}(v_iv_j) \qquad = F^N_{Y_1L}(v_iv_j)$$

for every $v_iv_j \in E$.
Hence BIVNG is $\approx$ BIVNIG. □

Definition 3.5. If $G^\bullet = (V, E)$ and $l(G^\bullet) = (I, J)$ be the ling graph, then C_1 and D_1 be the BIVNS on V and E and take A_2 and D_2 be the BIVNS on I and J respectively.
$l(G^\bullet) = (C_2, D_2)$ is the BIVNLG of BIVNG = G= (C_1, D_1)

$$T^P_{C_2U}(P_i) = T^P_{D_1U}(i) \quad ; T^N_{C_2U}(P_i) = T^N_{D_1U}(i)$$
$$= T^P_{D_1U}(u_iv_i) \qquad = T^N_{D_1U}(u_iv_i)$$
$$T^P_{C_2L}(P_i) = T^P_{D_1L}(i) \quad ; T^N_{C_2L}(P_i) = T^N_{D_1L}(i)$$
$$= T^P_{D_1L}(u_iv_i) \qquad = T^N_{D_1L}(u_iv_i)$$
$$I^P_{C_2U}(P_i) = I^P_{D_1U}(i) \quad ; I^N_{C_2U}(P_i) = I^N_{D_1U}(i)$$
$$= I^P_{D_1U}(u_iv_i) \qquad = I^N_{D_1U}(u_iv_i)$$
$$I^P_{C_2L}(P_i) = I^P_{D_1L}(i) \quad ; I^N_{C_2L}(P_i) = I^N_{D_1L}(i)$$
$$= I^P_{D_1L}(u_iv_i) \qquad = I^N_{D_1L}(u_iv_i)$$
$$F^P_{C_2U}(P_i) = F^P_{D_1U}(i) \quad ; F^N_{C_2U}(P_i) = F^N_{D_1U}(i)$$
$$= F^P_{D_1U}(u_iv_i) \qquad = F^N_{D_1U}(u_iv_i)$$
$$F^P_{C_2L}(P_i) = F^P_{D_1L}(i) \quad ; F^N_{C_2L}(P_i) = F^N_{D_1L}(i)$$
$$= F^P_{D_1L}(u_iv_i) \qquad = F^N_{D_1L}(u_iv_i)$$

for each $P_i, P_j \in I$ and

$$T^P_{D_2U}(P_iP_j) = \min\left(T^P_{D_1U}(i), T^P_{D_1U}(j)\right)$$
$$T^P_{D_2L}(P_iP_j) = \min\left(T^P_{D_1L}(i), T^P_{D_1L}(j)\right)$$
$$T^N_{D_2U}(P_iP_j) = \max\left(T^N_{D_1U}(i), T^N_{D_1U}(j)\right)$$
$$T^N_{D_2L}(P_iP_j) = \max\left(T^N_{D_1L}(i), T^N_{D_1L}(j)\right)$$
$$I^P_{D_2U}(P_iP_j) = \max\left(I^P_{D_1U}(i), I^P_{D_1U}(j)\right)$$
$$I^P_{D_2L}(P_iP_j) = \max\left(I^P_{D_1L}(i), I^P_{D_1L}(j)\right)$$
$$I^N_{D_2U}(P_iP_j) = \min\left(I^N_{D_1U}(i), I^N_{D_1U}(j)\right)$$
$$I^N_{D_2L}(P_iP_j) = \min\left(I^N_{D_1L}(i), I^N_{D_1L}(j)\right)$$
$$F^P_{D_2U}(P_iP_j) = \max\left(F^P_{D_1U}(i), F^P_{D_1U}(j)\right)$$
$$F^P_{D_2L}(P_iP_j) = \max\left(F^P_{D_1L}(i), F^P_{D_1L}(j)\right)$$
$$F^N_{D_2U}(P_iP_j) = \min\left(F^N_{D_1U}(i), F^N_{D_1U}(j)\right)$$
$$F^N_{D_2L}(P_iP_j) = \min\left(F^N_{D_1L}(i), F^N_{D_1L}(j)\right)$$

for each $P_i, P_j \in J$ and

Proposition 3.6. *Prove that $L(G^\bullet) = (IJ)$ is a crisp lined graph of $G^\bullet$. If $L(G)$ is the BIVNLG of BIVNG.*

Proof. We know that $L(G)$ is a BIVNG.

$$T^P_{C_2U}(P_i) = T^P_{D_1U}(i)$$
$$T^P_{C_2L}(P_i) = T^P_{D_1L}(i)$$
$$T^N_{C_2}(P_i) = T^N_{D_1}(i)$$

$$
\begin{aligned}
I^P_{C_2U}(P_i) &= I^P_{D_1U}(i)\\
I^P_{C_2L}(P_i) &= I^P_{D_1L}(i)\\
I^N_{C_2U}(P_i) &= I^N_{D_1U}(i)\\
I^N_{C_2L}(P_i) &= I^N_{D_1L}(i)\\
F^P_{C_2U}(P_i) &= F^P_{D_1U}(i)\\
F^P_{C_2L}(P_i) &= F^P_{D_1L}(i)\\
F^N_{C_2U}(P_i) &= F^N_{D_1U}(i)\\
F^N_{C_2L}(P_i) &= F^N_{D_1L}(i)
\end{aligned}
$$

Here for each $i \in E, P_i \in I$ iff $i \in E$ and

$$
\begin{aligned}
T^P_{D_2U}(P_iP_j) &= \min\left(T^P_{D_1U}(i), T^P_{D_1U}(j)\right)\\
T^P_{D_2L}(P_iP_j) &= \min\left(T^P_{D_1L}(i), T^P_{D_1L}(j)\right)\\
T^N_{D_2U}(P_iP_j) &= \max\left(T^N_{D_1U}(i), T^N_{D_1U}(j)\right)\\
T^N_{D_2L}(P_iP_j) &= \max\left(T^N_{D_1L}(i), T^N_{D_1L}(j)\right)\\
I^P_{D_2U}(P_iP_j) &= \max\left(I^P_{D_1U}(i), I^P_{D_1U}(j)\right)\\
I^P_{D_2L}(P_iP_j) &= \max\left(I^P_{D_1L}(i), I^P_{D_1L}(j)\right)\\
I^N_{D_2U}(P_iP_j) &= \min\left(I^N_{D_1U}(i), I^N_{D_1U}(j)\right)\\
I^N_{D_2L}(P_iP_j) &= \min\left(I^N_{D_1L}(i), I^N_{D_1L}(j)\right)\\
F^P_{D_2U}(P_iP_j) &= \max\left(F^P_{D_1U}(i), F^P_{D_1U}(j)\right)\\
F^P_{D_2L}(P_iP_j) &= \max\left(F^P_{D_1L}(i), F^P_{D_1L}(j)\right)\\
F^N_{D_2U}(P_iP_j) &= \min\left(F^N_{D_1U}(i), F^N_{D_1U}(j)\right)\\
F^N_{D_2L}(P_iP_j) &= \min\left(F^N_{D_1L}(i), F^N_{D_1L}(j)\right)
\end{aligned}
$$

Here for each P_i, P_j are belongs to J.

Then $J = \{P_i, P_j : P_i \cap P_j$ is not equal to null set and $ij \in E$ also $i \neq j\}$

Proposition 3.7. *Prove that $L(G) = (C_2, D_2)$ is a BIVNLG of a BIVNG, $G = (C_1, D_1)$*

Proof. Let us consider

$$
\begin{aligned}
T^P_{D_2U}(P_iP_j) &= \min\left(T^P_{C_2U}(P_i), T^P_{C_2U}(P_j)\right)\\
T^P_{D_2L}(P_iP_j) &= \min\left(T^P_{C_2L}(P_i), T^P_{C_2L}(P_j)\right)\\
T^N_{D_2U}(P_iP_j) &= \max\left(T^N_{C_2U}(P_i), T^N_{C_2U}(P_j)\right)\\
T^N_{D_2L}(P_iP_j) &= \max\left(T^N_{C_2L}(P_i), T^N_{C_2L}(P_j)\right)\\
I^P_{D_2U}(P_iP_j) &= \max\left(I^P_{C_2U}(P_i), I^P_{C_2U}(P_j)\right)\\
I^P_{D_2L}(P_iP_j) &= \max\left(I^P_{C_2L}(P_i), I^P_{C_2L}(P_j)\right)\\
I^N_{D_2U}(P_iP_j) &= \min\left(I^N_{C_2U}(P_i), I^N_{C_2U}(P_j)\right)\\
I^N_{D_2L}(P_iP_j) &= \min\left(I^N_{C_2L}(P_i), I^N_{C_2L}(P_j)\right)\\
F^P_{D_2U}(P_iP_j) &= \max\left(F^P_{C_2U}(P_i), F^P_{C_2U}(P_j)\right)\\
F^P_{D_2L}(P_iP_j) &= \max\left(F^P_{C_2L}(P_i), F^P_{C_2L}(P_j)\right)\\
F^N_{D_2U}(P_iP_j) &= \min\left(F^N_{C_2U}(P_i), F^N_{C_2U}(P_j)\right)\\
F^N_{D_2L}(P_iP_j) &= \min\left(F^N_{C_2L}(P_i), F^N_{C_2L}(P_j)\right)
\end{aligned}
$$

Here for every P_i and $P_j \in J$ and also take

$$
\begin{aligned}
T^P_{C_1U}(i) &= T^P_{C_2U}(P_i); \quad T^P_{C_1L}(i) = T^P_{C_2L}(P_i)\\
T^N_{C_1U}(i) &= T^N_{C_2U}(P_i); \quad T^N_{C_1L}(i) = T^N_{C_2L}(P_i)\\
I^P_{C_1U}(i) &= I^P_{C_2U}(P_i); \quad I^P_{C_1L}(i) = I^P_{C_2L}(P_i)
\end{aligned}
$$

$$F^P_{C_1U}(i) = F^P_{C_2U}(P_i); \quad F^P_{C_1L}(i) = F^P_{C_2L}(P_i)$$
$$F^N_{C_1U}(i) = F^N_{C_2U}(P_i); \quad F^N_{C_1L}(i) = F^N_{C_2L}(P_i)$$

here for every $i \in E$

$$\begin{aligned}
T^P_{D_2U}(P_iP_j) &= \min\left(T^P_{C_2U}(P_i), T^P_{C_2U}(P_j)\right) \\
&= \min\left(T^P_{C_2U}(i), T^P_{C_2U}(j)\right) \\
T^P_{D_2L}(P_iP_j) &= \min\left(T^P_{C_2L}(P_i), T^P_{C_2L}(P_j)\right) \\
&= \min\left(T^P_{C_2L}(i), T^P_{C_2L}(j)\right) \\
T^N_{D_2U}(P_iP_j) &= \max\left(T^N_{C_2U}(P_i), T^N_{C_2U}(P_j)\right) \\
&= \max\left(T^N_{C_2U}(i), T^N_{C_2U}(j)\right) \\
T^N_{D_2L}(P_iP_j) &= \max\left(T^N_{C_2L}(P_i), T^N_{C_2L}(P_j)\right) \\
&= \max\left(T^N_{C_2L}(i), T^N_{C_2L}(j)\right) \\
I^P_{D_2U}(P_iP_j) &= \max\left(I^P_{C_2U}(P_i), I^P_{C_2U}(P_j)\right) \\
&= \max\left(I^P_{C_2U}(i), I^P_{C_2U}(j)\right) \\
I^P_{D_2L}(P_iP_j) &= \max\left(I^P_{C_2L}(P_i), I^P_{C_2L}(P_j)\right) \\
&= \max\left(I^P_{C_2L}(i), I^P_{C_2L}(j)\right) \\
I^N_{D_2U}(P_iP_j) &= \min\left(I^N_{C_2U}(P_i), I^N_{C_2U}(P_j)\right) \\
&= \min\left(I^N_{C_2U}(i), I^N_{C_2U}(j)\right) \\
I^N_{D_2L}(P_iP_j) &= \min\left(I^N_{C_2L}(P_i), I^N_{C_2L}(P_j)\right) \\
&= \min\left(I^N_{C_2L}(i), I^N_{C_2L}(j)\right) \\
F^P_{D_2U}(P_iP_j) &= \max\left(F^P_{C_2U}(P_i), F^P_{C_2U}(P_j)\right) \\
&= \max\left(F^P_{C_2U}(i), F^P_{C_2U}(j)\right) \\
F^P_{D_2L}(P_iP_j) &= \max\left(F^P_{C_2L}(P_i), F^P_{C_2L}(P_j)\right) \\
&= \max\left(F^P_{C_2L}(i), F^P_{C_2L}(j)\right) \\
F^N_{D_2U}(P_iP_j) &= \min\left(F^N_{C_2U}(P_i), F^N_{C_2U}(P_j)\right) \\
&= \min\left(F^N_{C_2U}(i), F^N_{C_2U}(j)\right) \\
F^N_{D_2L}(P_iP_j) &= \min\left(F^N_{C_2L}(P_i), F^N_{C_2L}(P_j)\right) \\
&= \min\left(F^N_{C_2L}(i), F^N_{C_2L}(j)\right)
\end{aligned}$$

The BIVNS C_1 proves the property

$$\begin{aligned}
T^P_{D_1U}(ij) &\leq \min\left(T^P_{C_1U}(i), T^P_{C_1U}(j)\right) \\
T^P_{D_1L}(ij) &\leq \min\left(T^P_{C_1L}(i), T^P_{C_1L}(j)\right) \\
T^N_{D_1U}(ij) &\geq \max\left(T^N_{C_1U}(i), T^N_{C_1U}(j)\right) \\
T^N_{D_1L}(ij) &\geq \max\left(T^N_{C_1L}(i), T^N_{C_1L}(j)\right) \\
I^P_{D_1U}(ij) &\geq \max\left(I^P_{C_1U}(i), I^P_{C_1U}(j)\right) \\
I^P_{D_1L}(ij) &\geq \max\left(I^P_{C_1L}(i), I^P_{C_1L}(j)\right) \\
I^N_{D_1U}(ij) &\leq \min\left(I^N_{C_1U}(i), I^N_{C_1U}(j)\right) \\
I^N_{D_1L}(ij) &\leq \min\left(I^N_{C_1L}(i), I^N_{C_1L}(j)\right) \\
F^P_{D_1U}(ij) &\geq \max\left(F^P_{C_1U}(i), F^P_{C_1U}(j)\right) \\
F^P_{D_1L}(ij) &\geq \max\left(F^P_{C_1L}(i), F^P_{C_1L}(j)\right) \\
F^N_{D_1U}(ij) &\leq \min\left(F^N_{C_1U}(i), F^N_{C_1U}(j)\right) \\
F^N_{D_1L}(ij) &\leq \min\left(F^N_{C_1L}(i), F^N_{C_1L}(j)\right)
\end{aligned}$$

Hence proved. □

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4 Conclusion

In this paper we talk about certain kinds of BIVNGs, Sub division of BIVNG, Total BIVNGs, BIVNLG and BIVNIG with isomorphism properties. In future we develop this concept to some other kinds of BIVNGs.

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Women Shopping Pattern Using social media Offered by Home Based Women Entrepreneurs

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Abstract

Everyday women consumers form impressions from brands advertisements, branded content, and interactions on social media. The experience that women consumers have towards their products, and increasingly, the experience what other consumers have towards their brand will impact their perception, and ultimately, their decisions to purchase. The women consumer's voice, whether in reviews on brands websites or social media platforms, is an extremely powerful influence in purchase decisions. With the spread of education and awareness, women entrepreneurs have shifted from the extended kitchen activities to various other activities with the emergence of various social media platforms. The present study is undertaken to know the shopping pattern among women using social platforms offered by the women entrepreneurs.

Keywords: Social Media, Women Entrepreneurs, Purchase decision, Women consumers.

Introduction

Social Media and Women Entrepreneurs

Social media shopping, also known as social commerce, refers to companies selling products directly within social media platforms. It differs from social media marketing, which uses content to drive traffic to websites. Instead, the entire shopping experience occurs within the social media platform. Each social media platform addresses e-Commerce differently. The social media's have in common is streamlining the process, requiring fewer clicks to buy than most websites. The most commonly used social media platforms are WhatsApp, Instagram, Facebook, LinkedIn and so on.

Women Entrepreneurs may be defined as the women or a group of women who initiate, organize and operate a business enterprise. A woman entrepreneur is, therefore, a confident, creative and innovative woman desiring economic independence individually and simultaneously creating employment opportunities for others. The typical women businesses are mainly the extension of kitchen activities, i.e., the 3 P's, viz., pickles, powder and pappad. The number of Women Entrepreneurs in India has increased gradually with the spread of education and social media awareness among women.

Statement of the Problem

India is the world's fastest growing economy, a rising global hotspot in making for their biggest trade needs. In the past few years, it has witnessed the entry of global giants like Walmart on its grounds and has the largest user base for tech giants like Facebook. At the heart of this growth is the 50 per cent women population, which is estimated to be driving around 85 per cent of the purchase decisions of an average household.

Scope of the Study

Gone are the days where a woman's purchasing power was limited to just grocery shopping. In India, almost 127 million females, almost 25.6 per cent is from the working class. Today, women are actively involved in decision making, from buying a car to property, women drive 70-80 per cent of all consumer purchasing which is a huge shift from earlier days. Hence, the study has been undertaken to analyse the shopping pattern of women using social media which is offered by home based women entrepreneurs.

Objectives of the Study

- To analyse the shopping pattern of women using social media's offered by the home based women entrepreneurs.
- To find out whether the social media platforms enable to build a community among them and assist to increase their visibility in the society.
- To ascertain whether purchasing through social media's provides them experience and gain knowledge to start-up their own small businesses at home.

Review of Literature

Saadia et.al (2012) focused on the buying behavior of women in Pakistan. A study has been carried out on 200 female respondents from the city of Lahore in Pakistan. The results indicate that women of Pakistan consider traditional word of mouth to be more authentic than social media for making purchase decisions related to their apparels[1].

Arul and Mohmadraj (2017) attempted to assess the impact of usage of social media on purchase decision process. The study finds that the social media is most widely used in information source for entertainment, networking, and information on new brands. Also, the social media reviews and opinions affect the purchase decision process; however, tendency of share their experiences post purchase is surprisingly good[2].

Viktoria, et.al (2021) aim to explore the impact of social media on consumer behavior, more specifically, it examines the influence of social media on the preference of specific e-shops during the first wave of the COVID-19 pandemic. The results revealed the existence of statistically significant differences in the use of social media during the first wave of the COVID-19 pandemic in terms of various demographic factors as well as a relatively weak relationship between the social media used and the purchase in the e-shop promoted on the social media[3].

Research Methodology

1. Data collection: The data was collected from primary and secondary sources. Primary data was collected through questionnaire via Google Forms from the women consumers of different places belonging to Vellore district and the secondary data was collected from books, magazines and websites etc.

2. Sampling size: 100 respondents were selected after considering time and cost.

3. Sampling method: Convenient sampling method is used to collect the data from the respondents.

4. Tools of analysis:

1. Simple percentage analysis
2. Factor Analysis

Data Analysis and Interpretation

Table 1 illustrates the demographic profile of the respondents, which exhibits that majority of the respondents i.e. 51 % fall into the age group of 20-30 years. Most of the women consumers surveyed are graduates with 64 % and 75% of the respondents are unmarried whose family income are below Rs.20,000. In the place of living, the survey showed that the majority of 48 % of the respondents belong to Vaniyambadi.

Table1: Demographic Profile of the Respondents

Variable	Category	Frequency	Percentage
Place of Living	Vaniyambadi	48	48
	Ambur	32	32
	Tirupattur	7	7
	Pernambut	3	3
	Gudiyattum	3	3
	Vellore	6	6
	Natrampalli	1	1
Age (years)	Below 20	37	37
	20-30	51	51
	30-40	9	9
	40-50	3	3
Qualification	SSLC/HS	14	14
	UG	64	64
	PG	14	14
	Others	8	8
Family Income (Rs.)	Below 20,000	45	45
	20,000-30,000	32	32
	31,000-40,000	8	8
	41,000-50,000	7	7
	Above 50,000	8	8

***Source**: Primary data*

Table 2 demonstrates the information about the shopping pattern of women using social media platforms. The table clearly depicts that 48% of the respondents purchase fashion clothing/accessories while 30% of the respondents purchase food/bakery products using social media's offered by home based women entrepreneurs. The highest number of women customers use what's app for purchasing showing 45% while 43% of the respondents use other social media like LinkedIn and YouTube. Regarding years of purchase, 31% of the respondents have been purchasing between 1 to 2 years through social media. With reference to purchasing mode 70% of the women customers prefer both online and physical stores to purchase.

Table 2: Purchasing Pattern

Variable	Category	Frequency	Percentage
Type of Products	Books/Stationaries	3	3
	Fashion Clothing/Accessories	48	48
	Home Appliances/Electronics	10	10
	Cosmetics	4	4
	Food/Bakery	30	30
	Others	5	5
Social Media Platform	Facebook	1	1

	Instagram	11	11
	Whats App	45	45
	Others	43	43
Years of Purchase	Below 1	31	31
	1-2	31	31
	2-4	28	28
	Above 4	10	10
Mode of Purchase	Online store	20	20
	Physical store	10	10
	Both	70	70

***Source**: Primary data*

Table 3 illustrates the Cronbach alpha which is the most widely used method for checking the reliability of scale and validity of items. In this table its shows that the reliability statistics for 21 items was 0.917 which has high reliability. This indicates that these items are mostly suitable for analysis.

Table 3: Reliability and Validity of Women's Sopping Pattern

Item	No. of Items	Mean	Variance	Std. Deviation	Cronbach's Alpha
Shopping Pattern	21	85.13	100.660	10.033	0.917

***Source:** Computed*

Table 4 indicates that the value of KMO for 21 items was 0.859 from which it is understood that the sample taken to process factor analysis was statistically significant.

Table 4: Factorial Validity by KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.859
Bartlett's Test of Sphericity	Approx. Chi-Square	1011.389
	df	210
	Sig.	.000

***Source:** Computed*

Table 5 illustrates that after examining the reliability of scale and the appropriateness of data, the questionnaire about shopping pattern of women was subjected to Principle Component Factor Analysis followed by Varimax Rotated Factor Analysis which yielded 5 factors. The solution was obtained by using fixed number of factors. Accordingly 5 items were selected for factor Cost efficiency, 4 items for Network building, 6 items for Promotion, 3 items for Review & Information and 3 items for Technical Adaptability.

Table 5: Loading of scale items on factors by Rotated Factor Matrix

Factors	Component

	1	2	3	4	5
Factor 1 - Cost Efficiency The cost of every products advertised in the social medias are at affordable cost	0.434				
The payment mode is always cash On Delivery (COD) which is comfortable among women consumers	0.377				
The shipping charges are free to the consumers belonging to the sellers place	0.476				
Online Payment is also accepted by the Home Based Women Entrepreneurs.	0.954				
For few products & the customers of different place, the payment is on prepayment mode	0.730				
Factor 2 - Network Building It helps women to build a community with the assistance of Home Based Women Entrepreneur		0.817			
It encourages & assists women to increase their visibility & that of their business in the society		0.731			
It helps Women to start-up their own small business at home		0.927			
Women's undertaking online business help us in making purchase		0.403	0.339		
Factor 3 - Promotion It is easier to gather the publicity activities on social medias			0.420		
Not only products are promoted in the social media, even the promotion of other Women Entrepreneurs are also given			0.309		
It helps to build Women Empowerment	.351				
Motivated to buy through online after noticing the various social media			.411		
Motivated to buy through online after realizing the benefits experienced by my friends & family members			.882		

Motivated to online purchasing after realizing the current trend of home based online business			.772		
Factor 4 - Review & Information Feedback & opinion from other women customers helps to trust the products offered					.722
The messages given by the Women Entrepreneurs while offering the products makes me feel trusted	.340		-.324		.691
The products rating scale given in the social medias creates confidence on the Home Based Women Entrepreneur.					.501
Factor 5 - Technical Adaptability Technical complications involved in purchasing through online are less				.388	
Basic technological education is sufficient enough to make orders]				.427	
Social media platform can be easily adaptable				1.097	
Extraction Method: Maximum Likelihood. Rotation Method: Promax with Kaiser Normalization.[a]					
a. Rotation converged in 7 iterations.					

Source: *Computed*

Table 6 depicts that there is a high degree of correlation between factors of women shopping pattern using social media.

Table 6: Correlation Matrix

Factor	Cost Efficiency	Network Building	Promotion	Review & Information	Technical Adaptability
Cost Efficiency	1.000	.528	.562	.339	.586
Network Building	.528	1.000	.602	.537	.436
Promotion	.562	.602	1.000	.536	.576
Review & Information	.339	.537	.536	1.000	.406
Technical Adaptability	.586	.436	.576	.406	1.000

Extraction Method: Maximum Likelihood. Rotation Method: Promax with Kaiser Normalization

Discussion

Women are goal oriented, independent, flexible, tolerant, creative, realistic, enthusiastic and energetic because of which the management style differs from their male counterpart. Women are by and large born managers as they manage their house. They can simultaneously do more than one task at a time and have good coordination skills. With the enhancement of information and technological developments there has been a significant growth in women empowerment. Today's modern women have less patience and less time to look for stores to get the best price for their products. Hence, they opt for shopping through social media's where they like to shop with their friends and relatives. Women encourage and advice each other to purchase different products with the help of social medias. The pandemic of Covid-19 has led women to use social media in order to connect with different aspects of their life.

Suggestion

Even though women consumers use social media as a platform for shopping but still there is a fear that exist between women. Not every women who shop through social media is happy with their online shopping experiences. Fake online shopping platforms display some great products on the website and attract customers to buy the product. Usually, websites which sell fake products instead of the genuine article, do not accept cash on delivery and request customers to make an online payment. But, in the end, customers will either receive the fake product or they will not receive the product at all. The social media platform should be cautious enough that their reputation does not get damaged due to the hackers and should take necessary steps so that women customers do not get affected and cheated.

Conclusion

Women have a different set of priorities, preferences and attitudes. The Covid-19 pandemic has shifted women consumer attitudes and multiple connected devices have changed the traditional linear path to resemble more of a maze. The explosion of digital channels, the always-on media ecosystem, and the emergence of an increasingly discerning female consumer is challenging even the savviest marketers who are choosing a marketing strategy. A women makes purchasing decision based on price and quality which helps the women entrepreneurs to encourage their customers and also offer 'friend' discounts. Hence, the study reveals that the women are satisfied by the shopping pattern using social media offered by home based women entrepreneurs.

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