

Athens Journal of Business & Economics

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The Athens Journal of Business & Economics (AJBE) is an Open Access quarterly double-blind peer reviewed journal and considers papers from all areas of business and economics, including papers on accounting, finance, management, marketing, organization etc. The AJBE welcomes theoretical (including methodological), empirical (including case-studies) and policy (i.e., descriptive and non-analytical) papers. Given the mission of Athens Institute the AJBE will also consider papers which emphasize country-related studies both at the business and the national economy level as well as economic history, history of economic thought and philosophy of economics papers. All papers are subject to Athens Institute's [Publication Ethical Policy and Statement](#).

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The current issue is the fourth of the twelfth volume of the *Athens Journal of Business & Economics (AJBE)*, published by the [Business & Law Division](#) and the [Economics Unit](#) of Athens Institute.

Gregory T. Papanikos
President
Athens Institute



Athens Institute for Education and Research

A World Association of Academics and Researchers

21st Annual International Symposium on Economic Theory, Policy and Applications 28-30 June & 1-3 July 2027, Athens, Greece

The [Economics Unit](#) of Athens Institute, will hold its **19th Annual International Symposium on Economic Theory, Policy and Applications, 28-30 June & 1-3 July 2027, Athens, Greece** sponsored by the [Athens Journal of Business & Economics](#). The aim of the conference is to bring together academics and researchers of all areas of economics and other related disciplines. You may participate as panel organizer, presenter of one paper, chair a session or observer. Please submit a proposal using the form available (<https://www.atiner.gr/2027/FORM-ECO.doc>).

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- Dr. Chris Sakellariou, Head, Economics Unit & Associate Professor of Economics, Nanyang Technological University, Singapore.

Important Dates

- Abstract Submission: **1 December 2026**
- Acceptance of Abstract: 4 Weeks after Submission
- Submission of Paper: **31 May 2027**

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- Greek Night Entertainment (This is the official dinner of the conference)
- Athens Sightseeing: Old and New-An Educational Urban Walk
- Social Dinner
- Mycenae Visit
- Exploration of the Aegean Islands
- Delphi Visit
- Ancient Corinth and Cape Sounion

Conference Fees

Conference fees vary from 400€ to 2000€
Details can be found at: <https://www.atiner.gr/fees>



Athens Institute for Education and Research

A World Association of Academics and Researchers

14th Annual International Conference on Business, Law & Economics **3-8 May 2027, Athens, Greece**

The [Business, Economics and Law Division](#) (BLRD) of Athens Institute is organizing its **14th Annual International Conference on Business, Law & Economics, 3-8 May 2027, Athens, Greece**, sponsored by the [Athens Journal of Business & Economics](#) and the [Athens Journal of Law](#). In the past, the **six units** of BLRD have organized more than 50 annual international conferences on accounting, finance, management, marketing, law and economics. This annual international conference offers an opportunity for cross disciplinary presentations on all aspects of business, law and economics. This annual international conference offers an opportunity for cross disciplinary presentations on all aspects of business, law and economics. Please submit an abstract (email only) to: atiner@atiner.gr, using the abstract submission form (<https://www.atiner.gr/2027/FORM-BLE.doc>)

Important Dates

- Abstract Submission: **6 October 2026**
- Acceptance of Abstract: 4 Weeks after Submission
- Submission of Paper: **5 April 2027**

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Secularization and the Economy: The End of Capitalism?

By Richard Christy*

International and national discussions of the economy have never been as intense, all-consuming, or global? The economy is the focus of personal conversations, newscasts, and global affairs panel discussions. While the state of national and international economies has been the topic of personal and public concern during times of recession, depressions, natural disasters, commodity shortages, and famine, the current debates seem distinctly different. Why at a time of potential individual and national prosperity is their growing concern that private, national, and global economies may collapse? Why are scientific and rational thought so full of promises in an age of reason seemingly unable to propose solutions to avoid a potential global economic crisis? Is the analysis provided by rational scientific thought unable to provide insight into this economic crisis because it ignores Weber's conclusion that capitalism is rooted in a religious /ethical foundation? What happens to capitalism if the religious/ ethical foundation of capitalism declines? Is the theoretical conclusion of Weber being willfully ignored or minimized by the assumption that religion no longer informs modern economic activities? The objective of this paper is to introduce the classical theoretical analysis of Max Weber that links Protestant religiosity to economic behavior. Secondly, to provide current literature, statistics data and theoretical research on secularization that indicates the place of religiosity in capitalist societies. While Weber identified the religious link between protestant Christianity precepts and capitalism, with the increasing secularization of post-modern societies can capitalism survive? What happens if the religious/ ethical roots of economic behavior are no longer sustained? As the subtitle of my paper suggests, are we witnessing "The End of Capitalism?" if the historic religious/ ethical roots of capitalism are lost and can capitalism, as we know it, survive?

Weberian Controversy

To discuss industrialization and the rise of capitalism is to address the "Weberian Controversy." Weber published his historic analysis of religiosity and economic behavior, The Protestant Ethic and the Spirit of Capitalism in 1905. He argued that a late form a protestant theology was essential for the emergence of capitalism. Since its publication, sociologists, historians, political scientists, and theologians have debated the impact of religious norms on economic behavior. Did Protestantism have a significant impact on the rise of capitalism as Weber argues?

There are two camps of critics of Weber's position, those that argue capitalism with a religious incentive that existed prior to Protestantism and those that challenge the post-reformation impact of Protestantism on capitalism. Weber's goal was not to

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substitute the one-sided materialism of Marx for a one-sided spiritual causal relationship of religion and economic behavior, but to focus on “one of the fundamental elements of the spirit of modern capitalism, and not only that but all of modern culture: is based on the idea of the calling.” (Weber 1958:180).

For Weber, the concept “calling” was fundamental to capitalistic culture. So fundamental was a “calling” in a capitalist culture, that individuals acknowledged their calling and performed labor as an end in and of itself. Puritans sought their callings, and according to Weber his generation of workers, work because “when asceticism was carried out of monastic cells into everyday life, and began to dominate worldly morality, it did its part in building the tremendous cosmos of the modern economic order.” (Weber 1958:181).

With the publication of the Protestant Ethic and the Spirit of Capitalism, it was immediately considered a classic but “subject to harsh criticism by many writers for its central assertion that the ascetic regulation of economic life coupled with restraint, prudent saving and a stringent attitude to work was religiously induced.” (Morrison 2006:313). Morrison defended Weber’s position arguing that Weber highlighted a “remarkable congruence between Protestantism and the development of modern capitalism” (Ibid: 314) and observed the rise of capitalism in those countries where Protestantism took hold.

According to Morrison, Weber had five key objectives, first to show that beginning in the seventh century the majority of commercial centers occurred as Protestantism was taking hold, second Protestant maxims placed a stamp on economic organizations such as attitudes to work, punctuality, and saving, third Calvin’s religious doctrine lead to economic conduct based on restraint, order, and a rejection of luxury and excess, forth the restrained economic conduct was not only an outcome of Calvin doctrine but was also a psychological motive and ethical religious precepts for controlling material reality and its temptations and fifth Calvin’s doctrine of predestination, being one of God’s elect, created an attitude to work and a rejection of luxury.

Together, these five factors were a dramatic contrast between capitalism and the economic behavior of the Middle Ages. Morrison points out that it is asceticism, the inner conscious self-denial of the material world and worldly pleasures are secondary to higher religious goals. In capitalism Weber argues that “asceticism had become a category of social action regulating conduct in the world, since only in societies where capitalism flourished was self-denial linked to economic success and achievement.” (Ibid; 314)

As noted before and worth repeating, it was not Weber’s goal to substitute a one-sided spiritualism for the one-sided materialism, he could not ignore that “one of the fundamental elements of modern capitalism, and not only that but all modern culture: is based on the idea of a calling.” (Weber 1958:180) Weber argues that “a calling is what is most characteristic of the social ethics of capitalistic culture and is in a sense the fundamental basis of it.” (Ibid:180) Protestantism and specifically the idea of a calling gave capitalism its ideological foundation.

In the Middle Ages a “calling” meant to serve God and the church. The Reformation reshaped “calling” to provide a worldly as well as otherworldly meaning. As Weber argued, the worldly application of the Protestant concept of a “calling,” included hard work, frugality, self-control, aestheticism, and accountability. For

Weber, these norms clearly contributed to “the fact that business leaders, and owners of capitalism and commercially trained personnel enterprises are overwhelmingly Protestants.” (Weber 1968)

What happens to the nature of work if the notion of a “calling” no longer exists? What happens to the nature of work and Weber’s thesis if a calling is no longer foundational to capitalism? Can modern social institutions and specifically capitalism survive? What do we learn from businessmen of the current state of the work ethic? Is the Protestant work ethic on the decline?

As limited as these observations are, a businessman, the owner of a retail store complained that he will not be hiring university students because of their economic behavior, and attitude to work. He said that when he hires staff to work eight hours a day, he is lucky if he gets five hours of solid labor from them. These employees arrive late, take extra time at lunch and breaks and repeatedly use their cell phones. After a two-weeks probation period he lets them go and many of them are shocked. When he explained to one former employee that he was not punctual, dependable, accountable, or hard - working, the former employee responded, “I did not know that is what you expected!”

Similarly, the founder and owner of a law firm explained how difficult it is for him to hire and keep a law clerk. As the owner of a busy law firm, he needs dependable, and experienced staff with existing computer skills. Staff must be willing to learn and adapt to the specific needs and requirements of the law firm. In the last two years he has hired and fired five law clerks. The applicants’ resumes and interview skills are impressive but their work ethic, attention to instructions, the lack of responsibility, and dependability made it impossible to offer them permanent employment.

Scott Gallaway describes the current work ethic in his description of his employment behavior in Notes on Being a Man.

When I was younger, I’d mostly end up getting fired
or I’d quit. For example, in college I’d be hungover and
show up late or having lunch with a friend and remember
suddenly I was due at work two hours earlier....and then
I would say something stupid or make an inappropriate
Joke and get canned, Things haven’t changed much.
(Gallaway 2025: 74).

What are these individuals observing? Are they observing some isolated incidents or the growing trend of the individualization and rationalization of work? What will an examination of secularization, defined as the decline in religious practice and public worship, reveal concerning the current religious/ ethical framework of Western society? What does the statistical data on religiosity in contemporary society indicate about the foundation of social institutions? What does the data suggest about the continuation of capitalism?

Secularization and Contemporary Society

In The Sociology of Religion, Harold Fallding states that sociologists have three concerns 1) the place of religion in society 2) how religion is pursued and 3) why individuals, groups, and societies pursue religion. What does Fallding observe about the pursuit of religion in Canadian society? How does Fallding affirm that the historic relationship between religious behavior and the economy exists as Weber argues?

Fallding notes that The Protestant Ethic and the Spirit of Capitalism was just one of Weber's studies of world religions. For Fallding, as for Weber it was only Protestantism that had a prominent impact on economic behavior. Individuals pursued their economic behavior, in the form of capitalism as an expression of their religious faith. As noted, earlier it was the presence of the religious/ethical calling in Protestantism that Weber argued was an essential and fundamental component not only for capitalism, but overwhelmingly the social behavior of modern culture.

Weber's answers Fallding's third question, why did individuals, groups and societies pursue religion? To Protestants work was a blessing and a service to God. Individuals fulfilled their "calling," by hard work, self-control, aestheticism, accountability, and thrift. Weber argues that this is why so many prominent business leaders, owners of capital and entrepreneurs were Protestant.

A Protestant, or a group of Protestants participated in a form of Christianity that acknowledged that whatever you do you, "do it as unto the Lord." Such religious imperatives in Weber's view were essential to the emerging economy known as capitalism and for participating in the "new" economy.

Morrison builds on Weber's position of a callings arguing that "in modern capitalism asceticism had become a category of social action regulating conduct in the world, since only in societies where capitalism flourished was self – denial linked to economic success and achievement." (Morrison 2006). Morrison identifies other variables leading to the decline of the feudal economy, but he supports Weber's position stating that there were "non-economic considerations of capitalist development discussed by Weber in the relationship between the economic and religious spheres," (Morrison 2006). By comparing the economic conditions in other countries, Weber demonstrated, using Morrison's words, how Protestant religious maxims provided "an unambiguous stamp on the economic organization of Western capitalism." (Morrison 2006). What is the impact on the economy if individuals, groups and a society ignore, erodes, or destroys the religious/ethical foundations of capitalism due to secularization? By secularization, I mean the decline of religious practice and public worship. What do we learn of religious behavior from the statistical data of Canadians?

According to Statistics Canada, religious affiliation in Canada has changed dramatically. In 1971, almost 90% of Canadians identified as Christian. By 2021, 53.3% claim to be Christian. In 1971, 5% of Canadians had no religious affiliation and in 2021, 34.6% had no religious affiliation. The United Church of Canada, one of the largest Canadian religious denominations had a membership of 14.6% of the total population in 1985 and in 2019 the membership is 3.8%. How would Weber view these changes? What conclusion would Weber make about a religious foundation to social action in Canada? Is it logical to assume the survival of a religious foundation to

capitalism after observing these religious trends? What would academics and pundits consider to be the future of capitalist behavior and the survival of capitalism with such a decline in Canadian religious behavior? In an age of science and reason it is easy for academics to ignore the place of religion in society. Is it also easy to assume that religious precepts no longer impact private and collective economic behavior? From a theoretical and philosophical position what is the place of religion in post-modern society according to Fallding?

Secularization and Post-modern Society

In the Sociology of Religion, Harold Fallding argues that sociologists are concerned with why individuals, groups, and societies pursue religion. Fallding is interested in the place of religion in advanced industrial societies. He observed the growing secularization of post-modern societies with a systematic decline in public worship, religious teaching, religious participation, and religious affiliation to the extent that “secularism indicates the exaltation of attitudes into a completed system and organization.... thus, becoming a religion of religion.” (Fallding 1972). With the decline of Western traditional religion, various forms of ism such as positivism, hedonism, materialism, consumerism, communism, secularism, among others seek to fill the void. Each proposed ism is profoundly different from the Protestant norms observed by Weber that provided the mental culture necessary for the emergence of capitalism. Is it possible that another ism could provide the ethical foundation necessary to sustain capitalism or a possible emerging new economic order? For Fallding the answer is no if “the single overall concept which expresses.... the fracturing of life’s unity is secularization.” (Fallding 1968)

If we accept as Weber did, that the emerging religious norms were essential for the formation of capitalism, is it possible that with increased secularization, we are witnessing the deconstruction of capitalism? Is it possible that there is a willful, systematic, deconstruction of religious values that threaten capitalism and other social organizations that support the existing social order?

Secularization in Canada and the United States

What does further statistical and theoretical data tell us of an existing religiosity in Canada and the United States? Is it possible that religious statistics and academic research will identify public and private expression of Judeo-Christian religious affiliation and social behavior in post-modern societies.

As noted earlier according to Statistic Canada, “in 1971 almost 90% of the population aged 15 and older identified as Christians. By 2021 Canadians aged 15 and older identifying with Christianity dropped to 53.3%.” (Cornelissen 2021) In 1971, 5% of ages 15 years and older reported no religious affiliation and in 2021, 34.6% reported no religious affiliation.

More significant than these national statistics is how respondents define the impact of their religious practice had and their day-to-day social activities. In 2019, of

the 68% of Canadians who reported a religious affiliation, 54% reported their religion or spiritual beliefs were important or very important to them. However, only 23% said they participated in group religious activities at least once a month. Cornelissen also notes that reporting religious affiliation does not necessarily mean religion informs their everyday life. Of those who reported having a religious affiliation, 18% reported that they rarely or never participate in group religious activities or on their own and “considered their religious or spiritual beliefs to be of little or no importance to how they live their lives.” (Ibid). How do sociologists and philosophers interpret what these statistics mean in contemporary society?

In his collection of articles titled *A Secular Age*, Charles Taylor asks the philosophical question, “what does it mean to say we live in a secular age?” (Taylor 2007) He writes that by “we” he means those who live in the West or more broadly those in the “North Atlantic world.” While secularity exists in other parts of the world as the Canadian statistics indicate, Taylor states that the existence of secularity is difficult to ignore. For Taylor, the pre-modern state was in “some way connected to, based on, guaranteed by some faith in, or adherence to God or some notion of ultimate reality.” (Ibid). He argues that the modern Western state has become freed of the religious/economic connection and religion has become a private matter. The connection between religion affiliation and social action is no longer self-evident. One understanding of secularity for Taylor has been the emptying from the public space of God or any reference to ultimate reality. As we engage in various “spheres of activities- economic, political, cultural, educational, professional, recreational – the norms and principles we follow, genially don’t refer us to God or to any religious beliefs.” (Taylor 2007).

Taylor examines in *A Secular Society* the changes that took place from a society in which it was impossible not to believe in God to one in which faith “is one human possibility among others.” (Ibid).

Taylor describes these changes in the chapter titled “The Malaise of Modernity.” Taylor observes three phases of secularity that he describes as the currents and counter currents of belief and unbelief. The first phase is how there came to be an exclusive humanistic alternative to the Christian faith. The second phase involves multiple critiques against religion and the generation of a few unbeliefs that function as options to faith. The third phase is the fractured culture, that reached “its culmination in the latter half of the twentieth century” (Taylor 2007) along with it “a generalized culture of ‘authenticity’, or expressive individualism, in which people are encouraged to find their own way, discover their own fulfillment, ‘do their own thing’” (Ibid).

For Taylor, the mental culture of Western societies has dramatically changed as individualism and self-interest increase and religiosity, not to mention Protestantism, no longer informs individuals and social institutions. It is the centrality of expressive individualism, the primacy of reason, and the loss of personal choice that challenges the very idea of community and corporate responsibility. Expressive individualism, science, and reason appear to have become increasingly a liability. They challenge the very value of capitalism based on a calling, the dignity of work, stewardship of your resources, hard work, responsibility, and accountability. Without those values that emerged from Protestantism in the initial phase of capitalism, how long can capitalism, historically based on cooperation, trust, support, fair competition and

community survive in secular societies based on expressive individualism? What Taylor calls the malaise of modernity, Rebecca Konyndyk DeYoung and David Brooks also troubled by the emerging mental fabric of Western society that is moving from civility not to mention from its religious roots. In *Glittering Vices*, De Young presents a discussion of a modern reaction to and a new interpretation of the seven deadly sins in the writings of Pope Gregory I and Thomas Aquinas. In his book *The Road To Character*, Brooks observed the changing goals of American university students and the emerging vocabulary choices of the American population.

DeYoung, an associate professor of philosophy, realized that when she was in graduate school she was reluctant to contribute to her classes because of a vice identified by Thomas Aquinas as “smallness of the soul.” By reading the virtues and vices proposed by Aquinas, she realized that they could be a catalyst for “spiritual growth” and that “most of us would benefit from some deeper moral reflection and self-examination.” (DeYoung 2009). De Young argues that most of us would benefit from a process of moral reflection and self-examination. Notice how far remove this process is from what Taylor identifies as expressive individualism, “doing your own thing.” DeYoung argues that there are intellectual benefits and payoffs in such reflections by providing the individual with a deeper understanding of themselves and the world. She argues that the traditional meaning of the vices has shaped our culture and social institutions and still influences and informs individual behavior whether we accept or reject their original meaning.

When De Young asks individuals to list various virtues, they “name things like honesty, courage, kindness, loyalty and fidelity; for vices, the list usually includes qualities like cowardice, greed, and selfishness.” (De Young 2009) Without knowledge of the original meaning of virtues and vices found in the list of Pope Gregory or Thomas Aquinas these are some of the contemporary ideas of virtues and vices. They indicate major differences from Pope Gregory list of vainglory, envy, sadness, avarice, wrath, and gluttony, or Thomas Aquinas’s list of vainglory, envy, sloth, avarice, wrath, lust, and gluttony. The original religious and theological meanings have lost their authority to challenge and/or support a framework for economic and social behavior.

De Young found that “many voices in contemporary culture unfortunately, dismiss, redefine, psychologize, or trivialize” (De Young 2009) the seven deadly sins proposed by Gregory or Aquinas. Some dismiss the vices claiming that they are not moral problems at all.

Whether the seven deadly sins are a moral problem or not, De Young has identified the further secularization of Western society. The presence or absence of these historic imperatives could inform current social action. Envy, greed, sloth and avarice could seriously impact an individual’s or a group’s economic ideas and social actions. These concepts continue to inform those individuals seeking to integrate the moral, religious directives of Gregory and Aquinas into their economic action and to turn from the prevailing values of contemporary society.

While Weber identified a Protestant religious foundation to capitalism, the list of vices from Catholic theology by Gregory and Aquinas also became fixtures that guided Christian social and economic behavior. While the number and content of the list underwent change, De Young argues that “by the time we get to Thomas Aquinas

in the thirteenth century, we find him synthesizing the wisdom of an amazing variety of predecessors in both philosophy and theology” (De Young 2009:29) to create a list to imprint the principles of moral theology and religiosity on society. The question for today is, do these values have the capacity to moderate and regulate social and economic behavior? De Young argues that for the first millennia the seven vices were at the heart of self-examination and moral formation both in the church and the broader society. After the Middle Ages and the Reformation, society moved towards modernity and increased industrialization. With modernity the seven deadly sins were increasingly marginalized and lost their impact on social and economic action. De Young notes that in contemporary discussion of virtues and vices seldom are the ideas of Gregory and Aquinas considered. De Young observes that if they are introduced, they are simplified, rationalized, stereotyped, and the source of humor.

David Brooks is interested in the changing values of university students. He examines the changing social and cultural norms of college students in his book The Road to Character. He discusses the available statistical data on the norms of first year college students in the United States. In general Brooks notes the social and cultural values in America are increasingly materialistic. “College students now say they put more value on money and career success.” (Brooks 2015) The yearly data from UCLA nation-wide survey of college students indicates that in 1966, 80% of freshmen stated they wanted to develop a meaningful philosophy of life. In 2015 less than half stated that to be a goal. In 1966, 42% of students and in 1990, 74% of students responded that becoming rich was important.

Brooks also noted there has been a noticeable change in language and vocabulary used by the American population. Over the past decades there has been an increase in the number of individualistic words and phrases referring to “self,” “I come first” and a decline in words referring to “community” or “common goal.” Brooks notes that over the twentieth century words like “character,” “conscience” and “virtue” have declined and over the twentieth century “gratitude” is down 49 per cent. “humbleness” is down 52% and “kindness” is down 56 percent.” (Brooks 2015)

Is it enough to say that in Western society there has been a shift from the ideas of what can I do or how can I serve to who can I be and how can I stand out? There is a growing body of literature and public discussions focused on the decline of ideas of calling, public service, and self-restraint in postindustrial societies. What we are learning from Brooks' analysis is the secularization of the ideals and goals of college students. What will be the economic ideas and actions of contemporary individuals? The evidence of the secularization of the West suggests that Weber's thesis of a relationship between religion and economic behavior no longer holds sway in the marketplace. With the decline, or as some would argue the collapse of Western religious tradition, what ism could emerge to fill the void?

For Durheim, it was positivism. Durkheim sought to encourage the moral rearmament of the French Republic by proposing a scientific moral order devoid of religious norms. Or could it be hedonism as documented in *How We Got Here: A Guide to Our Anti-Christian Culture* by Jonathon Van Maren. For Van Maren there has been an extensive secularization of society. He writes that he grew up in

a society in which values “based on Scriptural revelation rather than the Sexual Revolution – still held sway.” (Van Maren 2024) He argues that the impact of the sexual revolution is so pervasive it now defines the social, cultural, religious, and economic norms of the West.

These examples of isms are just two of many that compete for dominance in contemporary society including but not exclusively, Christian nationalism, secularism, materialism, consumerism, communism, and Nazism. Each proposed is profoundly different from the Protestantism that Weber argued provided the mental culture and a social stability that gave rise to capitalism.

Values, mores, and laws inform personal and social behavior in society. Weber identified the mental culture of calling, hard work, frugality, and self-control at the core of capitalism. The capitalist economy flourished. But as capitalism became a global phenomenon the knowledge and adherence to its religious foundation are changing. What values and norms, whether religious or secular, could emerge to temper the expressive individualism of “looking after number one,” endless amassing of wealth for wealth’s sake or extreme individualism at the expense of the collective? Is it possible to expect a moral or ideological framework to emerge that could prevent what many journalists, pundits and social analysts label the unravelling of civility that challenges the survival of the social/economic institutions?

Davetian writes in *Civility: A Cultural History* that he differs with those who warn that the ability to be civil is beyond repair. While Davetian is sad at the financial and political attitudes and actions that make it difficult to maintain an altruistic outlook, he argues that “since the beginning of human history philosophers and priests have done their utmost to convince human beings to respect and get along with one another.” (Davetian 2009) He argues that the civilizing process is incomplete and that we cannot become a truly civil society until we have an in-depth understanding of civility and incivility. His goal is to provide a multi-dimensional review of civility from 1200 to the present day for France, England, and America. His goal is to study the social and personal psychology of human interaction in these societies regarding the practices of civility and the possibility of a “future civility ethic.” Is it possible that he might discover a future ethic that would fill a void left by the impact of secularization of Western social and economic behavior? Is it possible that the analysis of 800 years of social history might provide an ethical guide for future social and economic behavior?

Davetian proposes definitions of civility at the personal and social level. He defines “courtesy and civility as the extent to which citizens of a given culture speak and act in ways that demonstrate a caring for the welfare of others as well as the welfare of the culture they share in common.” (Davetian 2009) He argues that his definition permits him to study the micro and macro dimensions of civility. His definition also enables us to understand the responsibility and accountability that Protestants had for the economic and social wellbeing of others.

For Davetian, the Renaissance and the Protestant Reformation were important and had an “immense influence on the individuals conceived of their place in the universe that was not as dependent on theological dogma.”

(Davetian 2009) Davetian noted that the rising educated university elite and merchant class responded to the emerging social philosophy and theology and moved beyond medieval dogma. The intellectual and merchant classes became the growing force of social and intellectual change.

Davetian argues that Machiavelli clearly understood the spirit of his time when he wrote *The Prince* and recognized the opportunities and limitations of power in a secular society. According to Davetian, Machiavelli recognized the need of a “ordered environment” so that society did not fall into chaos. Recognizing the element of self-adjustment and self-restraint distinguished Machiavelli’s theory of socialization and interaction. Davetian points out that there is a point at which humans must restrain their ambition in the interest of individual and collective survival. Economic, political, and social behavior cannot get out of control if they are to be a service to the individual and society.

Davetian devotes the first part of his book to understanding the civility traditions of France, England, and America from 1200 to 1900 in order to understand the political, economic, philosophical religious and moral transformation of each country. While each society developed different civility preferences, the industrialization of each society did not substantially level their national identity or national ideology. Davetian noted that it was such factors as “political philosophy, system of government, religion intellectual history, geography, economy, familial norms, and the manner in which emotions were restrained and expressed.” (Davetian 2009). Extensive social and cultural forces taken together distinguished the differences in “value tendencies” between France, England and the United States concerning individualism versus collectivism, large or small power distances in positions of authority and uncertainty avoidance. It was the degree of risk, welcomed or avoided that shape and determined the values in these societies. His longitudinal study revealed that in periods of reformation and revolution each society made efforts to bring their mental culture back to civility.

According to Davetian each of these three societies have a great deal to teach contemporary societies about social and economic change. His conclusion concerning civility is that change is complex. To question the survival of capitalism and even Western society, changes in social norms will occur. There will be changes not only in religion but also in forms of civility. Such change may suggest the disintegration of society as we know it, but Davetian informs us that we may be witnessing another period of self-adjustment. The words of Machiavelli stand as a caution to the change agents and the most avid rebel or reformer that societies require a degree of stability to survive. Can Davetian’s study of civility temper the current theoretical debate on capitalism and renew those perennial religious /ethical norms as a necessary part of self-adjustment?

Conclusion

With the publication of the Protestant Ethic and the Spirit of Capitalism, Weber introduced the academic world to the idea that there was more to economic behavior than materialism. His idea that protestant Christianity provided a much-needed religious foundation for capitalism created an intellectual controversy. His observation that a calling, hard work, discipline, service, self-control, and frugality rooted in Protestant theology ushered in an economic era that differed from the traditional economic behavior of Medieval society is still controversial. Morrison, in supporting Weber's position, elaborates on the congruence between Protestantism and modern capitalism. Are the all-consuming international and national debates on economic change a current example of the reluctance to accept the possibility of a spiritual rather than a material foundation to capitalism?

In accepting Weber's theoretical conclusion, the question remains what happens to capitalism if the religious/ethical foundation is lost or declines? Will capitalism survive if the norms of calling, hard work, frugality, self-control, aestheticism, accountability, and thrift decline or are lost? Fallding argues that sociologists have concerns about how and why religion is pursued in society. As the global debate on the economy intensifies, surely we must consider Weber's analysis of religious/ethical norms and economic behavior.

The statistical data and theoretical research on religion indicates that the place of religion/ethical behavior in post - modern society is on the decline. The data from Statistics Canada and the theoretical and statistical analysis of Taylor, De Young, and Brooks suggest that the civil and the religious/ethical norms of society are being replaced. The literature indicates that secular values and norms, described as expressive individualism and "looking after number one" inform social and economic activities. While the social norms are not fully established to create a new social and economic order, there are obvious trends that suggest society is moving into a period of fractured culture, extreme individualism, self-interest and looking after number one.

Davetian takes a different position from those who warn that the ability to be civil is beyond repair. He writes that he is sad at the financial, political, and social action that makes it difficult to maintain an altruistic outlook in society. However, Davetian argues that history is full of examples of philosophers and priests attempting to convince human beings to get along with each other.

Like others, Davetian recognizes the unravelling of civility and the deconstruction of institutions. His goal in studying France, England and America is to identify a possible "future civility ethic." Is it possible that Davetian might provide an ethic that will fill a growing void? Will this civility ethic have the potential to provide a new phase of capitalism with a stabilizing foundation?

It is speculative to assume that we are witnessing the end of capitalism, especially if a future civility ethic can become a category of social action regulating conduct in society and the world. It is less speculative to assume that individuals will increasingly identify as having no religion, therefore increasing the secularization of post-modern society. With the possibility of a new civil ethic and increasing secularization, meaning the decline of religious norms, I would suggest that the greatest challenge will be how to share the rewards of a new capitalism throughout society.

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Communication adds Value to the Business. Prospects of Blockchain Technology

By Giuseppina Iacoviello^{}, Elena Bruno[±] & Iacopo Cavallini[°]*

In this paper we explore the role of blockchain technology as an opportunity to improve corporate communications within the overall process of digitalization. The manuscript builds on a literature review and the previous development of a theoretical background to the topic. The article then proceeds to present and justify a possible mechanism by which blockchain would allow for a greater dissemination of information to stakeholders through the creation of increased selectivity, timeliness and quality of the flow of communications. The proposed framework is based on the reasoning that the properties of blockchain: decentralization, encryption and immutability of the data hosted on the platform ensure secure and auditable communications of hard and soft information transacting value in corporate governance strategic credibility. The model depicts how installing distributed communications nodes within organizations may streamline operational procedures, facilitate greater openness and data integrity and help to synchronize consistency of information across business units and customers. The mechanism also realistically accounts for potential barriers of entry costs investment, technical complexity and significant changing regulatory work needed to gain initial adoption. Positioning blockchain technology within the wider subject area of business communications can help develop a general and holistic view of the potential impact of new technology on communication not just internally within firms, but also with external stakeholders (Oubaziz and Matmar 2021). The contribution of this paper is theoretical but lays out a conceptual model that can be used for empirical research in various organizations across different industries and settings to test and further the proposed theory.

Keywords: *blockchain technology, business communication, stakeholder engagement, information systems.*

Introduction

The contemporary business landscape is experiencing an unprecedented technological revolution that is fundamentally reshaping how organizations operate, communicate, and create value. As next generation information technologies such as big data analytics, cloud computing, artificial intelligence, machine learning, and mobile internet continue to gain widespread adoption and sophistication, society is undergoing a profound shift from traditional, centralized information systems to intelligent, distributed, and interconnected smart information systems (Bonsón and Bednárová 2019, Verhoef et al. 2021). Furthermore, recent academic research

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highlights that blockchain adoption is not confined to the financial sector; industries such as supply chain management, creative industries, healthcare, and public administration have begun to integrate blockchain into their communication strategies. Peer-reviewed studies (Apte and Petrovsky 2016, Wamba and Queiroz 2019) demonstrate how blockchain can ensure verifiable, immutable information flows, addressing the longstanding issue of information asymmetry in stakeholder relations. The integration of blockchain with AI-driven analytics offers further opportunities to personalise communication without compromising data security or compliance, setting new standards for transparency and accountability in the digital economy.

This transformation represents more than mere technological upgrading; it constitutes a fundamental reimagining of organizational structures, processes, and strategic orientations. Digital transformation, as conceptualized by leading scholars in the field, encompasses an all-encompassing, methodical redesign of organizational infrastructure and operations that strategically leverages data as the primary driving force and information technology as the foundational basis for competitive advantage.

Among the emerging technologies driving this digital revolution, blockchain technology (BT) has emerged as particularly significant, with scholars and practitioners increasingly recognizing its potential to play a critical role in the digital era, carrying profound implications for businesses, governments, and society as a whole (Tapscott and Tapscott 2016). The significance of blockchain extends far beyond its original application in cryptocurrency systems, demonstrating remarkable versatility and potential across multiple domains including supply chain management, healthcare, education, voting systems, and notably, corporate communication (Shahbazi and Byun 2022).

Supported by innovative technological advances encompassing blockchain, artificial intelligence, big data analytics, and Internet of Things (IoT) integration, the digital economy has emerged as a new frontier for global competitiveness and a primary source of economic growth for nations worldwide (Chowdhury et al. 2023, Goldfarb and Tucker 2019). This technological convergence is creating unprecedented opportunities for organizations to reimagine their communication strategies and stakeholder engagement approaches.

In this rapidly evolving digital landscape, the importance of effective communication has become more pronounced than ever before. Internal and external communication within modern organizations is increasingly integrated, forming complex networks of information exchange that span traditional organizational boundaries (Parker et al. 2016, Bharadwaj et al. 2013). The term “communication” in this context refers not merely to information transmission, but to the strategic, voluntary actions that businesses undertake to meet diverse stakeholder needs, often prioritizing stakeholder interests alongside organizational objectives.

Beyond enhancing organizational reputation, effective communication serves as a powerful mechanism for employer brand development, stakeholder trust building, and ultimately, value creation (Cornelissen 2020). Given the critical role that communication plays in determining business success, the demand for sophisticated, technologically enhanced communication strategies continues to grow exponentially. This growth is driven by the recognition that communication serves as the primary

vehicle through which organizational awareness, knowledge transfer, and stakeholder engagement are generated and sustained.

However, for modern organizations, effective communication represents an increasingly delicate and complex undertaking. If communication strategies are not carefully conceived, strategically planned, and expertly executed, stakeholders may quickly develop skepticism and subject organizational messages to intense critical scrutiny (Argenti 2015). Companies that excessively publicize their activities without demonstrating authentic commitment risk creating doubt regarding the genuine motivations behind their actions, potentially undermining stakeholder trust and organizational credibility.

Despite the extensive adoption of digital communication platforms, organizations still face persistent challenges such as information asymmetries, opportunistic behavior, and lack of traceability in internal reporting processes. Traditional centralized communication systems remain vulnerable to manipulation, human error, and authentication issues that undermine stakeholder trust and decision-making effectiveness (Mayer et al. 1995, Dhanesh 2017). In this context, blockchain-based systems offer a radically different paradigm for designing information flows and governance structures. By combining immutable records, programmable rules through smart contracts, and decentralized validation mechanisms, blockchain technology addresses critical gaps in current organizational communication architectures (Han et al. 2023). This study focuses on how these distinctive technical properties can be leveraged to redesign internal communication processes and improve transparency, accountability, and stakeholder trust in organizational decision-making (Cornelissen 2020). The integration of blockchain principles with organizational communication theory represents a significant theoretical and practical opportunity that remains underexplored in the contemporary literature, particularly regarding how organizations can operationalize immutable, decentralized communication systems while maintaining strategic control, regulatory compliance, and stakeholder engagement across diverse stakeholder groups.

Recent literature on digital transformation and corporate communication shows that new technologies significantly affect transparency, accountability and stakeholder engagement, yet current systems still suffer from information asymmetries and limited auditability. Blockchain-based architectures may address these limitations by providing immutable records, programmable rules and decentralised validation, thereby reshaping internal communication processes and governance mechanisms.

This research emerges from a critical need to understand how emerging technologies, particularly blockchain, can address these communication challenges while creating new opportunities for organizational value creation. The study aims to examine the role of information technology in communication diffusion by analyzing the innovation pathway and adoption potential of blockchain technology within organizational communication frameworks. To this end, this paper is designed as a conceptual ‘model’ paper in the sense of Jaakkola (2020), that is, it develops a theoretical framework specifying constructs, mechanisms, and boundary conditions, grounded in existing theories and empirical findings, rather than collecting new empirical data.

The primary research question guiding this investigation is: *In a fast-paced workplace environment where information technology utilization is becoming*

increasingly critical for competitive advantage, is it feasible that blockchain-enabled business models can make communication more appropriate and effective in providing sustainable value to organizations?

This question encompasses several sub-dimensions including technological feasibility, organizational readiness, stakeholder acceptance, and value creation potential.

The paper is systematically structured to address these complex questions through the following sections: Section 2 provides an extensive literature review covering blockchain technology foundations, communication theory, and their intersection. Section 3 presents the comprehensive theoretical model developed through this research. Section 4 discusses practical implications and applications. Finally, conclusions are presented along with acknowledged limitations and detailed directions for future research.

The primary contribution of this research is demonstrating how blockchain technology can serve as a powerful driver of information flow within organizations while simultaneously functioning as a catalyst for business model innovation in the communication domain.

Literature Review

Blockchain is a concept first introduced along with a working definition of the Bitcoin protocol (Nakamoto, 2008). This was when the tenets and the technological infrastructure underlying the blockchain system were formalised in 2008. Blockchain technology has been said to work when data on transactions can be recorded cryptographically on consecutive blocks of data forming a distributed ledger (DL) maintained simultaneously at many nodes (Dol et al. 2019).

Theoretical grounding for blockchain adoption was provided in the recent literature using the Technology–Organization–Environment (TOE) model (Tornatzky and Fleischer 1990) and other contexts where blockchain adoption was seen to occur under the pressure of the environment, the desire to remain competitive and a technological readiness internal to the organisation (Almomani et al. 2020). Blockchain also in the post-COVID world has been seen to contribute to lessening the spread of fake news as information from blockchain streams can be verified (Dwivedi et al. 2022).

Relative to other methods of sending information in a secure way, such as permissioned databases and private or public key-encrypted cloud services, the blockchain might be seen to be of higher initial complexity in installation but the benefits relative to building trust over the longer term and for regulatory compliance are unmatched (Hallerbach et al. 2018). Research threads on the nature and direction of blockchain technology evolution point to the adoption of hybrid models where blockchains and IoT networks are integrated into single infrastructures to, for example, improve traceability in supply chains and automation in stakeholder engagement and agreement (Reyna et al. 2018, Latukefu and Agarwal 2019).

Recent contributions in peer-reviewed literature emphasize the strategic importance of digital transformation and technology adoption for improving stakeholder engagement and transparency (Parker et al. 2016). Digital transformation has been shown to significantly reshape how organizations manage communication

and coordinate stakeholder interactions across multiple channels and contexts (Kane et al. 2015). Furthermore, contemporary research highlights how modern information technologies can support corporate responsibility objectives and enhance organizational governance mechanisms (Brecht et al. 2022).

The blockchain technology at the time of its development in the early 2000s, was considerably simple in its range of applications as it was used almost exclusively for cryptocurrency transactions and financial ledger use cases. Over time the uses for blockchain technology have been discovered and demonstrated in practically every industry (Swan 2015, Mougayar 2016). This journey reveals how technology can be versatile and has been flexible to the core need of the times, to provide a solution to issues of trust, transparency and decentralised coordination. At the most basic level, blockchain can be said to be a new way of information processing and transaction validation.

Strictly defined, a blockchain is a DL that is maintained by each node of a decentralised system (Yermack 2017, Zheng et al. 2017). Such a system ensures that information is replicated in the ledger and stored at multiple independent nodes, with the integrity of information and the robustness of the system ensured by consensus algorithms. The term consensus in this regard refers to a set of processes by which a single system state can be guaranteed by multiple independent parties (Cachin and Vukolić 2017). There are different types of consensus algorithms; the most well-known among them being Proof of Work (PoW). There have however been other consensus mechanisms developed over time in attempts to address specific needs and increase efficiency. These include Proof of Stake (PoS), Delegated Proof of Stake (DPoS), and Practical Byzantine Fault Tolerance (PBFT) (Cachin and Vukolić 2017).

Blockchain networks can take different forms depending on the permissions accorded to participants and other factors. Public blockchains are also known as permissionless and can be used to send, receive and view any information on the network by any user (Buterin 2014). As nodes on the network, these users can also participate in the network consensus mechanism. This configuration allows for the maximum level of decentralisation and transparency; however, it may present the issue of scalability and energy consumption. Permissioned, also called private blockchains, are also managed by network operators who control access and decisions made on the network (Hyperledger 2018). Private or permissioned systems also sometimes come under the Distributed Ledger Technology (DLT) broad taxonomy, which they are part of, but which also has other members such as permissioned blockchains and IOTA (Kirilenko et al. 2018). These systems are much more streamlined and efficient but present a less decentralised state as compared to public blockchains.

Over the past several decades, there has been a significant shift in the theory of organisational communication. Communication models are no longer strictly linear or hierarchical but often acknowledge the complex networks through which information moves within organisations and beyond (Putnam and Mumby 2014). Even more traditional approaches to information exchange have put significant focus on the act of sending messages, following the lead of Shannon and Weaver's (1949) mathematical theory of communication.

However, more recent theories of organizational communication have recognized that communication is much more complex, involving multiple stakeholders, multiple

channels, and complex feedback loops that give rise to dynamic information ecologies (Cornelissen 2020, Miller 2015).

Modern stakeholder theory, as first developed by Freeman (1984) and subsequently elaborated on by numerous other scholars, has placed particular emphasis on the importance of managing relationships with a wide range of stakeholder groups, including not only employees, customers, and suppliers, but also investors, regulatory bodies, and society as a whole (Harrison et al. 2010). Each of these stakeholder groups has its own information needs, communication preferences, and expected values.

This multiplicity of stakeholders presents significant challenges for organizations attempting to develop comprehensive communication strategies that can effectively meet the needs of various stakeholder groups without diluting message consistency and organizational authenticity (Cornelissen 2017).

The increasing digitization of organizational communication has fundamentally altered the nature of business communication with stakeholders. Digital media have created new opportunities for real-time, interactive communication, while also increasing expectations of transparency, responsiveness, and personalization (Bharadwaj et al. 2013, Kane et al. 2015). Social media platforms, mobile devices, and digital collaboration tools have democratized communication, enabled direct stakeholder engagement while also created new challenges related to message control, consistency, and authenticity (Kietzmann et al. 2011). This view of technological change is consistent with broader analyses of the “second machine age,” which describe how advanced digital technologies structurally reshape work, productivity and value creation at the macro level (Brynjolfsson and McAfee 2017).

Building on unified conceptualizations of digital transformation that emphasize holistic organizational change (Gong and Ribi re 2021), recent studies show how digital technologies reshape stakeholder communication, transparency and responsiveness. In understanding how organizations come to adopt and implement new technologies, it is worth looking to established technology acceptance models. For example, Davis’s (1989) Technology Acceptance Model (TAM) posited that intention to adopt technology is influenced by perceived usefulness and perceived ease of use. Subsequent elaborations of TAM, such as TAM2 and the Unified Theory of Acceptance and Use of Technology (UTAUT), have added additional factors such as social influence, facilitating conditions, and individual differences (Venkatesh et al. 2003). These models can provide important insights into factors likely to influence blockchain adoption for communication, suggesting a need to clearly demonstrate value propositions while addressing potential implementation challenges.

Rogers’ (2003) Diffusion of Innovations Theory provides another useful framework for considering blockchain adoption in the context of organizational communication. This theory proposes that there are five key characteristics that influence the rate of adoption for innovations: relative advantage, compatibility, complexity, trialability, and observability.

Blockchain technology presents interesting challenges and opportunities along each of these dimensions. Blockchain has already demonstrated significant potential in the use cases for supply chain management, where its ability to provide an immutable, transparent ledger of transactions and processes addresses key issues related to

traceability, authenticity verification, and the coordination of disparate stakeholders (Suwanposri et al. 2021, Catalini 2017, Kshetri 2018). These use cases are highly pertinent for communication management as they reflect blockchain's ability to facilitate information flow and exchange between different stakeholders with competing interests and needs. This can provide a useful basis for considering its potential in more general communication contexts.

Blockchain identity management systems offer promising prospects for secure, decentralized identity verification and authentication (Dunphy and Petitcolas 2018). This is a use case that also has clear pertinence to the communication domain, demonstrating how blockchain can address key communication security and stakeholder authentication issues.

Smart contracts, which are self-executing contracts with the terms of the agreement explicitly stated in code, are another key blockchain application with organizational communication implications (Szabo 1997, Christidis and Devetsikiotis 2016). Smart contracts can enable organizations to facilitate transparent, efficient interactions with stakeholders with less dependence on traditional intermediaries. While the individual fields of blockchain technology and organizational communication have been the subject of extensive research, the study of the intersection of these fields remains relatively underexplored.

Recent research has begun to start posing questions about the potential for blockchain to improve the transparency, security, and efficiency of communication (Yli-Huumo et al. 2016, Zheng et al. 2017, Han et al. 2023). Recent empirical work in the marketing domain also shows that blockchain-based architectures can enhance trust, transparency and efficiency in managing digital customer relationships, strengthening the case for blockchain-enabled communication systems (Hashem 2024).

The present literature review has identified significant potential for theoretical development at the intersection of blockchain technology and organizational communication. In particular, there is a clear need for more comprehensive frameworks explaining how blockchain's unique characteristics can be leveraged to address common communication challenges and create new value for organizations and their stakeholders.

Theoretical Model

Our theoretical model was built upon a systematic synthesis of literature that covered three main bodies of knowledge: blockchain technology, organizational communication theory, and models of information system adoption. The proposed framework integrates and expands upon existing theories to account for the unique characteristics and functionalities of blockchain technology in addressing contemporary communication challenges. The extended version of the model also accommodates cross-border legal harmonisation, cultural readiness, and digital literacy of stakeholder groups as additional factors influencing the success of the implementation. Potential KPIs might include decreases in information disputes, improved decision-making lead times, and increased stakeholder trust levels post-implementation. The integration of feedback loops into the model allows for adaptive

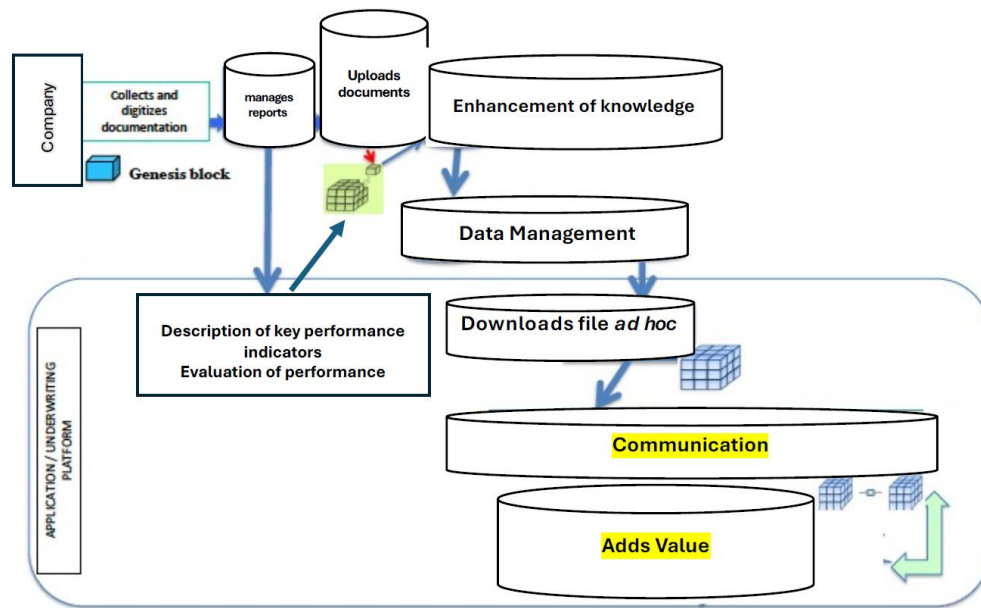
governance, enabling the communication system to dynamically adjust to technological and regulatory changes. Sector-specific customisation—for instance, in heavily regulated industries such as pharmaceuticals or energy—can be employed to further test the model's robustness and applicability.

This paper follows the standard format for a conceptual model manuscript, as defined by the recent discourse on methodological research and conceptual studies within the social sciences (Whetten 1989, MacInnis 2011, Jaakkola 2020). It involves the creation of a theory that reveals the constructs, processes, and boundary conditions through the use of existing theories and empirical research without the collection of new data (Weick 1989, Cropanzano 2009). The analysis draws upon three theories: blockchain technology, distributed ledger technology, organizational communication theories, and information technology adoption theories. It integrates these theories in an understandable manner to address the primary question of how blockchain technology may affect organizational communication among organizational stakeholders.

In addition, the study incorporates various forms of meta-theoretical approaches such as the TOE model, technology acceptance models such as TAM and UTAUT, diffusion of innovations, and stakeholder theories to examine the relationships, constructs, and illuminate the assumptions that guide the development of the proposed mechanisms and constructs within the theory (MacInnis 2011, Jaakkola 2020). In keeping with the recent discourse on conceptual research, the manuscript establishes the logic between the claims, grounds, and warrants that are associated with the primary relationships within the proposed theory. In this context, the grounds are the existing research studies, the claims are the propositions associated with the proposed mechanism or constructs within the theory, and the warrants are the fundamental assumptions upon which the theory was developed (Whetten 1989, Cropanzano 2009).

The model-building process followed a structured process that started with an exhaustive literature review, followed by variable identification and relationship mapping, the designing of the conceptual framework and model theory verification by consulting subject matter experts and through peer review. This helps to ensure the model is both theoretically sound and practically applicable as proposed.

The model assumes that (1) organizations are confronted with increasingly complex ecosystems of stakeholders requiring more advanced communication strategies, (2) blockchain technology can offer inherent capabilities to resolve traditional communication problems, (3) that both the technological and organisational factors need to be considered for successful implementation, and (4) value generation occurs through improved stakeholder relationships and organizational efficiency. Governance using information technology can produce value for the organization by providing quantitative and qualitative information to all participants in the ecosystem, radically revolutionising the usual operations of the company. This is clearly depicted in the proposed theoretical model in Figure 1.

Figure 1. *The Structure of Blockchain and the Flows of Information*

Source: Original elaboration by the author.

In the diagrammed framework, we can see that communication networks both direct and mediated ones could be targeted towards the general community through open, transparent, and governed channels. This communication can be intentionally directed towards specific stakeholder groups, and also in different formats including commercial information, institutional information, managerial information, financial communication, and stakeholder engagement.

Types of information flows can be categorised into two broad sections:

- Hard information flows refer to measurable and objective data such as financial data, performance metrics, compliance reports, and operational data. The tamper-proof and auditable ledger features of blockchain technology ensure data integrity and prevent any post-facto alterations or manipulations, instilling greater stakeholder confidence in the reported data.
- Soft information category can be defined as including qualitative insights, observations, strategic reports, cultural messaging, and relationship-building information. While these have been traditionally difficult to structure and store in systematic manner, blockchain technology makes it possible to code and release soft information in a secure manner through smart contracts and automated information distribution processes.

Blockchain networks rely on an intrinsically secure design that is afforded through both the encryption provided by cryptographic hashing and the use of mathematical and sequential linking between blocks (Han et al. 2023). This makes it close to impossible for bad actors to alter or tamper with data without being noticed, as re-computing previous blocks would be necessary to adjust the mathematics underpinning the block to be changed. This technological structure results in the creation of records that are immutable and free from risk of human error, which leads

to more efficiency and far less risk of breaches of compliance (Shah and Jani 2018).

The process of information acquisition, processing, and dissemination can be summarised as follows:

- Input Phase: the process commences with the collection of extensive data both hard and soft which is applicable to the communication requirements of stakeholders. This information can include financial information, operational data, strategic insights, market analysis, regulatory updates, and feedback from stakeholders through the several organizational channels and external sources.
- Processing and Quality Assurance: Upon collection, all materials, whether of tangible or intangible nature, that are necessary to fulfil the communication needs of stakeholders regarding particular decisions or initiatives, are passed through an algorithmic quality assurance test. This mechanism of quality control, much like a pre-approval step, allows for automated evaluation of the precision, pertinence, completeness, and regulatory compliance of the information.
- Data Structuring and Customisation: the next step involves the organisation and tailoring of the information data to match particular stakeholder requirements, while also facilitating compliance with key communication principles such as selectivity (communication is reaching the intended audiences), efficacy (facilitating informed decision-making), and rapidity (ensuring timely delivery of information).

Blockchain technology assumes organizational-level decentralisation and distributed data processing, which means every worker has a crucial role to play in terms of contributing to the information flows, ensuring that organisational communication is an emergent network property and not simple top-down information sharing.

Further, employees are active nodes in the network, who manage distributed information and partake in the generation of new blocks regardless of geographical location. This means that the model makes it possible for all members of the organisation to be able to participate and contribute to communication processes.

In addition, the presence of distributed nodes also provides system robustness while also enabling much faster and efficient communication. Communication transparency and effective governance is ensured through shared consensus mechanisms, but there is also tight control on data access, reporting, and classification.

Immutable and transparent ledgers for organisational communications and decisions using blockchain technology, on the other hand, will increase trust among stakeholders radically. Individual stakeholders can independently confirm the authenticity of information and track communication histories, which helps reduce information asymmetry and build trust.

Furthermore, automated processes facilitated by smart contracts can minimize the need for manual intervention, reduce errors, and speed up communication loops. This results in cost savings and improved stakeholder experience through faster and more efficient communication.

Finally, organizations that successfully implement blockchain-based communication systems can create a unique value proposition based on transparency, speed, and improved stakeholder engagement capabilities. This can help establish a competitive advantage and create a lasting competitive moat.

Implementing blockchain-based communications systems, however, requires a high level of technical expertise, significant infrastructure investment, and ongoing maintenance capabilities. Organizations must either develop or acquire specialized skills and knowledge and ensure system integration with existing IT infrastructure.

Successful implementation also requires comprehensive change management efforts, including employee training, cultural alignment, process redesign, and stakeholder education. Resistance to change is a common challenge that must be anticipated and managed. Additionally, the evolving regulatory landscape creates uncertainties in terms of blockchain deployment requirements, data privacy obligations, and compliance issues. Organizations must be prepared to adapt to these changes without sacrificing operational flexibility. In conclusion, while the proposed model offers several potential benefits for stakeholder communications, it is essential to consider and carefully evaluate various critical success factors before implementation. These factors include the technological feasibility of the solution, the organization's readiness and capacity, stakeholder acceptance and involvement, cost-benefit analysis, risk assessment, and potential value creation. Success metrics should be defined, encompassing both quantitative (cost reduction, efficiency improvement, response time) and qualitative (stakeholder satisfaction, trust levels, relationship quality) measures.

Discussion

There are many economic sectors where our model demonstrates that blockchain can be used to optimise communication processes.

In the financial services industry, blockchain-based reporting, notifications and transparency mechanisms can provide stakeholders with real-time, auditable, and tamper-evident communication of transaction processing, compliance status, risk management activities and other critical business information (Gomber et al. 2018). Banks and other financial institutions can implement blockchain solutions to ensure transparent and reliable communication with regulators, customers and other stakeholders (Arora and Nabi 2022).

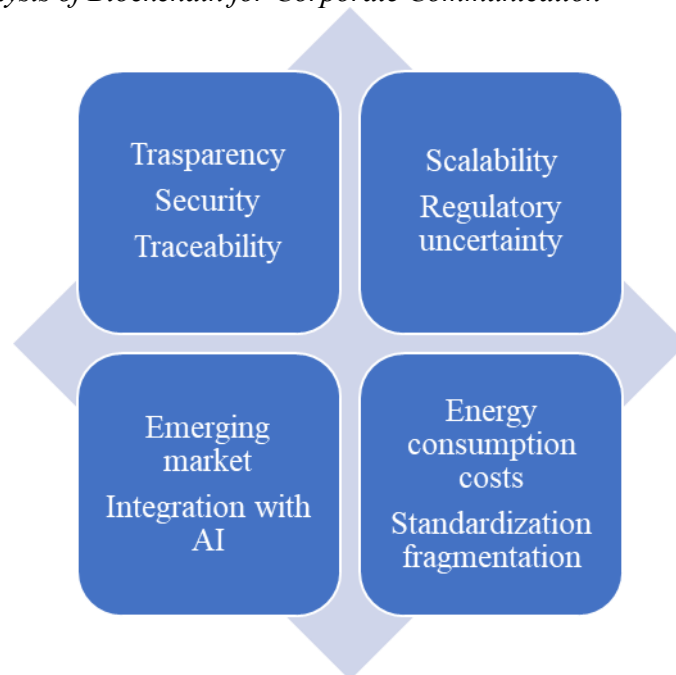
In healthcare, blockchain-based communication systems can provide secure, transparent, and auditable exchange of patient data, treatment plans, and research results while ensuring privacy, security, and regulatory compliance with healthcare regulations such as HIPAA and GDPR (Adegoke et al. 2024). Hospitals and medical research institutions can use blockchain communication systems to increase transparency, trust, and collaboration among stakeholders while maintaining patient confidentiality and privacy.

In the manufacturing industry, blockchain-based reporting, notifications, and transparency systems can be implemented to provide stakeholders with real-time visibility into supply chain activities, quality control processes, and sustainability initiatives, thus building trust and enabling better-informed decision-making. Similarly, in digital marketing and e-CRM contexts, blockchain has been shown to improve the effectiveness of customer relationship management by increasing transparency, data integrity and perceived trust in firm–customer interactions (Hashem 2024). Mini-case studies can be included to showcase the versatility of blockchain-

enabled communication systems. For example, in the energy industry, blockchain-based reporting has been used to provide real-time certification of renewable energy production and consumption, thus building stakeholder trust in sustainability claims.

In the education industry, universities have experimented with blockchain to issue verifiable and tamper-proof digital diplomas and university announcements, thus reducing administrative overhead.

Figure 2. *SWOT Analysis of Blockchain for Corporate Communication*



Source: Original elaboration by the author.

In the future, convergence between blockchain communication systems and other technologies, such as decentralized digital identity systems, can further enhance stakeholder engagement and autonomy. Organizations can consider implementing blockchain communication systems through a phased approach, starting with pilot projects in selected departments or stakeholder groups and gradually scaling up to an enterprise-wide implementation.

Organizations can enter into strategic partnerships with technology vendors, industry consortiums, and universities to overcome technical and resource challenges and share the costs and risks of implementation. Organizations should have comprehensive risk management plans to address potential technical failures, security vulnerabilities, and system integration issues. Operational risks, such as employee resistance, stakeholder confusion, and process disruption, should be anticipated and addressed through detailed change management and communication plans. These benefits are particularly relevant in an environment where social media usage has been associated with higher susceptibility to misinformation and even false memories when objective knowledge is low (Scuotto et al. 2021).

Conclusion

This study shows that blockchain technology is a relatively new kind of decentralized distributed database, and the already existing characteristics of persistency, anonymity, and audibility create many opportunities for change in the practice of organizational communication.

Blockchain technology is a useful medium for reducing costs by optimizing the verification process. However, the critical problem in the ethical dimension is the need to resolve the tension between a culture of radical transparency and the right to privacy and data minimization (EU GDPR) (Martin-Bariteau 2018). As a result, in managerial practice, it is necessary to include not only technical preparedness but also ethical governance and co-design of communication protocols with all the stakeholders on the principles of blockchain technology.

Empirical research needs to be conducted in order to prove the suggested model; in this case, in longitudinal and cross-industry case studies that compare similar industries in more and less “trust and technology-friendly” cultural contexts. In addition, an interesting direction for further development could be the study of hybrid systems on the blockchain with other safe information transmission technologies (to reduce the risk of “collapse” if there is a failure with one of them) (Prewett et al. 2020). Blockchain works on very basic principles of transparency with pseudonymity and, by radically improving traceability and data transparency, allows stakeholders to communicate more efficiently.

The paper presents the significant impact of blockchain technology as it directly provides stakeholders with soft information and has the potential to affect the decision-making process and, as a result, stakeholder behaviors. This becomes a very large step forward for the improvement of competencies of organizations’ communication and, therefore, offers many different possibilities.

The proposed theoretical model is based on two primary positive benefits that directly come from the use of blockchain technology in organizational communication: (1) the opportunity to obtain and utilize specific soft information through advanced IT methods and, (2) the possibility of direct assessment and/or input of information to organizational matters by all members of the organization. In addition, it becomes possible to rapidly improve the pace of verification/authentication procedures, and as a result, the blockchain-based communication can significantly increase the pace of decision making by reducing the information asymmetry and the related risk, thus significantly improving organizational efficiency.

Blockchain technology has many benefits for the development of business efficiency in operations. These benefits include:

1. Improved Quality and Safety of Data: blockchain technology ensures enough safety and control mechanisms that can lead to high-quality data in which errors and duplication are eliminated.
2. Elimination of Data Redundancy: it is done by ensuring that there is no repeated addition of data to the blockchain, thereby avoiding the possibility of “double data” entry and upholding the integrity of data.
3. Improved Risk Management: a mechanism that establishes blockchain-enabled communication approaches can provide significant benefits in risk-sharing as well as stakeholder coordination.

In spite of its very positive potential for lowering costs and improving efficiency, blockchain technology still lags behind traditional methods of communication in terms of resource requirements. The costs associated with developing and implementing blockchain infrastructure and technology are still significant and will most likely require very large initial investments, possibly rendering blockchain technology adoption infeasible for smaller organizations with constrained financial resources (Sugandh and Tawheed 2022).

Another significant barrier to widespread blockchain technology use is the high consumption of computational and energy resources. Traditional consensus mechanisms require substantial resources, for example, computing power for Proof of Work systems and stake prerequisites for Proof of Stake systems, which can be extremely expensive for organizations and devices with low-resource constraints (Cao et al. 2019).

Other challenges include determining roles in the implementation of digital platforms, the development of clear rules for accessing and using information by different categories of users, and other similar controls on the proper processing of critical and sensitive data (Brecht et al. 2022). The proposed model requires a large amount of human capital and, consequently, significant financial expenses in order to help provide effective management in the corporate environment. Organizations have to build capabilities for managing blockchain technology, change management, communication with stakeholders, and continuous operation of the system.

This study has certain limitations that need to be discussed. First, since the contribution is of theoretical nature, empirical testing needs to be performed in order to illustrate the practical applicability of the proposed framework. Second, this study was conducted as a part of an ongoing project of a broader scale, and further adjustments and elaborations based on empirical research across various firms and industries are required.

Future research should focus on:

1. Empirical Validation: performing extensive field tests of the proposed model in a variety of industries and organizational settings.
2. Comparative Analysis: which analyzes the relative performance of blockchain-based communication systems compared to traditional ones.
3. Cost-Benefit Analysis: developing comprehensive economic models to assess the financial impact of blockchain adoption.
4. Regulatory Impact Studies: which examines the influence of changing regulatory environments on blockchain communication adoption.
5. Cross-Cultural Research: which analyzes the influence of cultural factors on blockchain adoption and the effectiveness of communication across different regions.

Eventually, our analysis highlights that companies interested in using blockchain for improvement of communication should:

- Conduct detailed feasibility studies looking at technical, financial, and organizational readiness.
- Formulate detailed change management plans covering all relevant stakeholder groups.
- Invest in employee training and the development of new capabilities.

- Develop clear governance structures to manage the blockchain systems.
- Define measurable success metrics and monitoring mechanisms.
- Consider partnerships and collaborative strategies to reduce the risks and costs of implementation.

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Service Quality and Customer Experience in Sync: Unpacking Value Co-Creation in Zimbabwe's Mobile Telecommunications Sector

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This study investigates the interdependent relationship between service quality and customer experience in Zimbabwe's mobile telecommunications sector, focusing on their role in value co-creation. The research adopts a positivist, quantitative approach to empirically examine how service quality and customer experience mutually influence each other. A structured questionnaire was administered to a sample of 306 participants across all ten provinces of Zimbabwe, and the data were analyzed using Structural Equation Modelling (SEM) in Statistical Packages for Social Sciences (SPSS) and Analysis for Moment Structure (AMOS). The findings reveal a significant and reciprocal relationship between service quality and customer experience, supporting the notion that these constructs function as interactive drivers of co-created value. As such this study advances theoretical understanding by validating the service quality and customer experience relationship. It also has practical implications for telecoms providers seeking to enhance their competitiveness through improved customer engagement and experience design. The research contributes to both academic discourse on service systems and the strategic direction of telecommunications firms operating in emerging markets.

Keywords: Service quality, consumer experience, value co-creation, mobile telecommunications, Zimbabwe.

Introduction

Zimbabwe's mobile telecommunications industry plays a pivotal role in the country's socio-economic development, as it serves as the primary channel for communication, digital inclusion, and financial services (Manuere *et al.*, 2021). Muchenje (2022) indicates that the Zimbabwe mobile telecommunications sector is dominated by three main mobile network operators namely Econet Wireless, NetOne, and Telecel Zimbabwe. This sector has undergone digital transformation, driven by the increased adoption of mobile internet, mobile money platforms and the demand for value-added services (Susilo & Dizon, 2023). Notwithstanding the growth experienced by the sector, Chitimira and Torerai (2023) assert that it faces persistent challenges such as network outages, data affordability issues, and infrastructure

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limitations, particularly in remote regions. The Postal and Telecommunications Regulatory Authority of Zimbabwe (POTRAZ) also agree that in as much as it seeks to ensure fair competition, innovation, and Service Quality (SQ) improvement, the sector faces SQ and Customer Experience (CX) challenges (POTRAZ, 2016, 2017, 2018, 2019). Gleim *et al.* (2024) and Serôdio *et al.* (2023) confirm that poor SQ and CX are resulting from lack of innovation by service providers in response to changing customer tastes and preferences.

Understanding the relationship between SQ and CX is key for ensuring customer loyalty (Chigwende & Govender, 2021). In the same vein, Xianguang *et al.* (2025) posit that SQ and CX drive customer engagement, since high SQ reflects network reliability, responsive customer service, and clear billing that builds trust and satisfaction, which are key to retaining users. Meanwhile, Dağaşaner and Karaatmaca (2025) assert that CX enhances emotional connection, making customers more likely to remain loyal, use more services, and advocate for the brand. SQ and CX also influence customer perceptions and behaviours, fostering deeper engagement and long-term customer value (Kamyabi *et al.*, 2025).

In the mobile telecommunications sector, improvements in SQ directly influence CX by reducing frustration and increasing satisfaction during user interactions (du Preez C & van Staden, 2024). Gustafsson *et al.* (2024) also suggest that positive CX influences perceptions of SQ, as emotionally satisfying and well-designed customer journeys lead to high quality reviews. According to Dam and Dam (2021), understanding this reciprocal relationship between CX and SQ enables providers to develop holistic strategies that address operational efficiency and create meaningful and engaging CX. This ultimately enhances loyalty, customer retention, and competitive advantage. The identification of significant SQ and CE dimensions equips industry with evidence-based strategies to optimise resource allocation, improve customer satisfaction, and strengthen brand loyalty. The current study contributes to theory by examining the direct and reciprocal relationship between SQ and CX, an area that remains underexplored in existing service marketing and customer behaviour literature. The study is grounded in SERVQUAL and CX models, which are integrated into a unified framework that reflects their dynamic relationship. This advances theoretical knowledge about how SQ and CX work together to promote consumer engagement in industries such as the telecoms industry.

Objectives

The primary objective is to establish the relationship between SQ and CX by addressing the following sub-objectives.

1. To measure key dimensions of SQ perceived by mobile telecommunications customers in Zimbabwe.
2. To evaluate the impact of SQ on CX within Zimbabwe's mobile telecommunications sector.
3. To assess the extent to which CX mediates or reinforces the effect of SQ on perceived value co-creation.

4. To identify which dimensions of SQ contribute most significantly to a positive CX in the Zimbabwean context.
5. To provide empirical evidence on how co-creation of value can be enhanced by optimizing SQ and CX interactions.

Methodology

This study was grounded in a positivist research philosophy, emphasising objectivity in examining the relationship between SQ and CX within Zimbabwe's mobile telecommunications sector. A quantitative survey research design was adopted, and a self-administered questionnaire was distributed to 306 participants drawn from all ten provinces of Zimbabwe to ensure a broad geographic representation of mobile telecoms customers. Convenience non-probability sampling was used to select respondents, although this limits the generalisability of the findings to the entire population. The questionnaire consisted of structured items measured on Likert scales, allowing for standardised and quantifiable responses relating to perceptions of SQ and CX. A pilot study conducted with seven participants from Harare assessed the instrument's clarity, relevance, and reliability. Ethical considerations were rigorously observed and informed consent was obtained from all participants, who were assured that participation was voluntary and guaranteed confidentiality and anonymity. Data collected were coded and entered into Statistical Package for Social Sciences (SPSS), where descriptive statistics and tests for validity and reliability, such as Cronbach's Alpha, were performed to assess the data's quality and consistency. Structural Equation Modelling (SEM) was then conducted using Analysis of Moment Structures (AMOS) software to examine the hypothesised relationships between SQ and CX.

Literature Review

SQ and CX have emerged as critical constructs that influence customer perceptions, behaviour, and overall satisfaction. Although global literature has extensively explored SQ and CX as individual drivers of customer satisfaction, attention is now being drawn to their interconnected and interactive nature in the context of value co-creation. This literature review explores foundational theories such as the Service-Dominant Logic, the SERVQUAL model, and CX Theory, synthesising empirical studies that examine the bidirectional relationship between SQ and CX. The review therefore lays the theoretical and empirical groundwork for conceptualising SQ and CX as mutually reinforcing mechanisms within a co-creative service environment.

Theoretical Foundations **Service-Dominant Logic Theory**

The Service-Dominant Logic (S-D Logic) Theory, advanced by Vargo and Lusch (2004) upholds a service-centered approach. According to Mazurov (2024),

value is co-created by providers and consumers who are active players in this process. In the Zimbabwean mobile telecommunications sector, S-D Logic Theory enhances the understanding of how SQ and CX interact to co-create value (Hartwig et al., 2021). Telecommunications services such as network reliability, customer support, data services, and digital platforms are key to value creation (Toscher, 2021). Ujiati and Marsasi (2024) highlighting value creation aver that CX is a dynamic and essential component of perceived value, rather than a passive outcome. Mele *et al.* (2014), too, opine that SQ and CX are interrelated elements in a co-creation system, where the provider's operational efficiency and the customer's perception and feedback contribute to mutual value.

SERVQUAL Model

The SERVQUAL model, advanced by Parasuraman et al. (1988), views SQ as the gap between customer expectations and perceptions in five key dimensions: tangibles, reliability, responsiveness, assurance, and empathy. In the Zimbabwean mobile telecommunications sector, the model is used to examine network service provider perception. Tien and Huong (2023) reinforce that the SERVQUAL model provides measurable indicators that can be quantitatively assessed to determine the extent of SQ. These indicators facilitate statistical analysis through survey instruments and support the alignment of operational strategies with customer-centred goals (Abdullah *et al.*, 2022). When integrated with concepts relating to CX and S-D Logic, SERVQUAL contributes to a deeper understanding of how value is co-created within service ecosystems. This model therefore constitutes a critical base for analysing the symbiotic relationship between SQ and CX within Zimbabwe's telecommunications industry.

Customer Experience Theory

The CX Theory emphasises the holistic, cumulative, and subjective nature of customer interactions with a company across all touchpoints and overtime (Lemon & Verhoef, 2016). Waqas *et al.* (2021), meanwhile, opine that experiences are co-created by the service provider and the receiver of these services. This theory therefore allows for an understanding of how customers evaluate service encounters based on functional performance and emotional or psychological outcomes (Barbu et al., 2021). Nguyen (2022) upholds the application of the CX theory and examines how perceived SQ contributes to positive or negative experiential outcomes. This framework enables the identification of experiential drivers that influence loyalty, trust, and long-term engagement. Accordingly, CX theory provides a critical conceptual foundation for examining how mobile telecoms providers in Zimbabwe could create more meaningful, engaging, and value-driven experiences for their customers.

Integrating the SERVQUAL Model, CX Theory, and S-D Logic Theory into a Single Conceptual Model

The conceptual model is a combination of the SERVQUAL Model, CX Theory, and S-D Logic Theory. This model provides a foundation for examining the relationship between SQ and CX within the mobile telecommunications sector in Zimbabwe. The SERVQUAL framework provides five empirically validated dimensions – tangibles, reliability, responsiveness, assurance, and empathy – that serve as indicators for measuring perceived SQ. The CX theory, meanwhile, supports the SERVQUAL theory since CX is the result of customers' interactions with service providers over time and across multiple touchpoints. CX captures the emotional, cognitive, and sensory components that influence how customers interpret SQ and overall brand engagement. S-D Logic Theory is the unifier for co-creation through interactions between customers and service providers, and by extension, the interaction between SQ and CX. S-D Logic Theory therefore justifies the conceptual model's assumption of a bidirectional relationship between SQ and CX, where improvements in SQ enhance CE, and enriched CEs, in their turn, shape perceptions of SQ. This cyclical feedback loop supports the idea that value creation is not linear but interactive and mutually reinforcing.

Service Quality

SQ influences customer satisfaction, customer retention, and competitive positioning and is commonly defined as the customer's overall evaluation of the quality-of-service delivery, based on their expectations and perceptions (Gonu *et al.*, 2023). Although many frameworks were developed to measure SQ, the most widely accepted one is the SERVQUAL model developed by Parasuraman *et al.* (1988). The model outlines five key dimensions that have been effectively adapted to the mobile telecommunications context, namely: tangibles, reliability, responsiveness, assurance, and empathy. These dimensions are explained in detail in the following section.

Tangibles

According to Cao *et al.* (2023), tangibles are physical and infrastructural elements through which services are delivered, and they include network infrastructure, customer service centers, mobile applications, and other visible elements. In the telecoms sector, this includes modern communication technology, signal towers, and user-friendly mobile interfaces. Tangibles also include digital interfaces, IT infrastructure, and the aesthetic and functional quality of virtual touchpoints. This shift towards digital technologies reflects a broader redefinition of "presence" and "perception" in service encounters, driven by innovation and changing consumer expectations.

Reliability

The reliability dimensions of SERVQUAL model assesses how consistently a service provider delivers on its promises and refers to its ability to perform the promised service reliably and effectively (Parasuraman *et al.*, 2002). Reliability reflects the extent to which customers can trust the service to function correctly every time, without errors, delays, or failures. According to du Preez and van Staden (2024) in telecommunications industries, reliability relates to system uptime, accurate billing, timely service delivery, and consistent performance. Customers expect reliable network coverage, uninterrupted data services, and consistent call quality and a lack of reliability undermines trust and satisfaction (Ingy Shafei, 2016). Li and Jia (2021) aver that reliability is measured through objective performance metrics and subjective customer perceptions. Since reliability directly influences customers' confidence in a service provider, it is a foundational component of SQ that impacts customer satisfaction and loyalty.

Responsiveness

Another SERVIQUAL dimension, responsiveness, refers to the willingness and ability of a service provider to assist customers promptly and effectively (Abdullah *et al.*, 2022). In the telecommunications context, responsiveness involves resolving service disruptions, answering calls and responding timeously to emails or messages (Følstad & Taylor, 2021). Ngai *et al.* (2021) opine that in digital environments, responsiveness relates to features such as real-time chatbots, automated status updates, or self-service options that smoothen the customer journey. Responsiveness shapes customer perception and when service providers respond promptly and helpfully, customers are more likely to feel valued and be satisfied. Conversely, delays or poor communication could lead to frustration and dissatisfaction, irrespective of the overall quality of the service. The next section discusses assurance, another service quality variable.

Assurance

Assurance is another service quality dimension that is critical in the telecommunications sector. Cui (2025) avers that the assurance dimension relates to the competence, courtesy, and professionalism of staff, particularly in managing customer concerns and providing technical support. Owusu-Kyei *et al.* (2023) also note that assurance inspires a sense of security, confidence and trust in a service provider's competence, courtesy and credibility. Koo *et al.* (2021), too, opine that assurance is reflected through staff competence, clear communication, confidential handling of customer information, and respectful treatment of them. In the telecommunications sector, customers rely on service personnel to provide accurate advice, resolve complex issues, and handle sensitive data securely (Owusu-Kyei *et al.*, 2023). According to Manukonda (2023), the ability of employees to deliver services with confidence and professionalism directly affects how safe and reassured customers feel. Kalia *et al.* (2021) therefore encourages employees to demonstrate knowledge, professionalism, and ethical behaviour in their interaction with customers.

Empathy

Empathy denotes a service provider's capacity to comprehend, attend to, and offer individualised attention to clients (Owusu-Kyei *et al.*, 2023). It also relates to how the organisation recognises and responds to individual customer needs, emotions, and circumstances, treating each customer as a valued person rather than merely a transaction (Kalia *et al.*, 2021). According to Abdullah *et al.* (2022), frontline staff play a crucial role in conveying empathy by showing sensitivity, flexibility and emotional intelligence during interactions. Gonu *et al.* (2023) highlight that empathy is demonstrated by adjusting services for elderly users, being patient with frustrated customers, or offering tailored solutions based on unique customer situations. Rane (2023) posits that a lack of empathy through robotic responses, indifference, or dismissive behaviour, could result in dissatisfaction and erode customer relationships, even if the technical aspects of service are adequate.

The study conducted by Elrahman and Kamal (2022) in Egypt's mobile telecoms sector confirmed the validity of the SERVQUAL dimensions in measuring user-perceived SQ. Similarly, Abdullah *et al.* (2022) demonstrated that SQ significantly impacts customer loyalty in the Kurdistan region, where reliability and assurance emerged as key drivers. Chigwende and Govender (2021) also employed SERVQUAL to analyse customer satisfaction, loyalty and switching consumer behaviour in the Zimbabwean mobile telecommunications sector. These and other studies underscore the model's adaptability and relevance across diverse geographical and socio-economic contexts, particularly in emerging markets, where quality of service remains a major concern.

Customer Experience

This study explores the relationship between SQ and CX as co-value creators in the telecommunications industry and this section explores key CX components. CX is the overall perception and feeling that a customer develops based on all interactions with a company, product, or service across the entire customer journey (Waqas *et al.*, 2021). Gustafsson *et al.* (2024) assert that CX encompasses rational and emotional responses at every stage of engagement, from initial awareness and purchase to service usage, support, and post-service evaluation. In the telecommunications domain, CX is shaped by digital and physical touchpoints, employee behaviour, ease of service access, and the emotional quality of interactions (Dağışaner & Karaatmaca, 2025). The aforementioned CX components will be discussed in detail hereafter.

Emotional Engagement

Emotional engagement is a CX indicator of how customers connect emotionally with a brand and how they feel during and after their interactions with the service provider (du Preez & van Staden, 2024). Research by Kumar *et al.* (2022) show that emotionally engaged customers are likely to forgive service failures, promote the brand, and maintain longer-term relationships, even when price or functionality is not of the highest quality. Ribeiro *et al.* (2024) also aver that organisations may struggle to

link emotional metrics to operational decisions. Despite these challenges, Gao *et al.* (2023) opine that emotional engagement remains a source of competitive advantage in creating meaningful and memorable CXs. Emotional engagement goes beyond transactional satisfaction to reflect the depth and quality of the emotional connection between a customer and a service provider.

Ease of use and Convenience

Ease of use and convenience refer to how simple, accessible, and efficient it is for customers to interact with a service provider (Made *et al.*, 2021). Mobile telecommunications customers engage with complex services such as billing, data plans, mobile apps, customer support, and ease of use and convenience influence perceptions of SQ and customer satisfaction (Al-Momani *et al.*, 2009). Azzahra and Kusumawati (2023) note that in mobile telecommunications, the focus is on intuitiveness and user-friendliness and the ease with which customers can navigate a website or mobile app, understand service information, or complete tasks such as checking data balances or upgrading plans. Diaz-Aviles *et al.* (2015) however, oppose over-automation or poorly designed self-service tools, which could be unsuccessful if they fail to consider less tech-savvy users or lack human support when needed. For this reason, Suffian *et al.* (2019) encourage organisations to balance digital efficiency with human support.

Interactions with Digital and Human Touchpoints

Interactions with digital and human touchpoints are also a critical component that affects CX. According to Lütjens *et al.* (2022) interactions with digital and human touchpoints are moments where a customer engages with the service provider through digital or human channels. Pal (2023) insists that such interactions shape the customer's perception and influence satisfaction, trust, and loyalty. Muthaffar *et al.* (2024) opine that in the omnichannel environment, customers expect seamless, coherent experiences across both digital and human touchpoints. Organizations should recognize, however, that digital efficiency must be complemented by human empathy, especially when resolving complex or emotional issues (Alifah & Windasari, 2024). Although some customers value personal interaction or require specialized assistance, relying on automation without adequate human fallback could alienate such customers. Organizations should therefore also train their staff to deliver consistent and empathetic customer service.

Perceived Control and Personalization

According to Le *et al.* (2022), perceived control is the customer's sense of autonomy and influence over their service interactions. Joosten *et al.* (2017) aver that when customers feel in control, they are likely to report positive experiences, satisfaction, and reduced stress, even in complex or technical service environments. Guo *et al.* (2016), however, argue that rigid processes, unclear options, or forced reliance on customer support could make customers feel powerless, leading to frustration and

dissatisfaction. Cloarec *et al.* (2024) states, in a similar vein, that too much control overwhelms users, particularly those who are less tech-savvy. Nelly (2024) suggests that personalisation involves tailored data plans based on usage history, customised promotions, relevant notifications, or recognising customers by name and context in service interactions. Hemker *et al.* (2021), in contrast, state that excessive personalisation could raise privacy concerns, especially if customers feel that their data is not being used in a transparent manner.

Interrelationship between SQ and CX

It has been shown that SQ influences CX, with authors such as Alifah & Windasari (2024) and García-Pascual *et al.* (2023) concluding that these two aspects have a mutual relationship. In their research titled “CX about SQ in Online Environment: A Case of Iran”, Sorooshian *et al.* (2013) indicate that high CX increases SQ perception. Similarly, Lemon & Verhoef (2016) affirm that memorable experiences raise consumer expectations and enhance their sensitivity to SQ. Empirical studies by Kim and Kim (2022) and Shyju *et al.* (2023) tested the mutual influence and confirmed the dynamic interplay between SQ and CX using structural equation modelling (SEM). These studies show that while SQ often serves as a predictor of CX, CX could also act as a mediator or feedback mechanism, thereby influencing SQ assessment. This reciprocal dynamic supports the Service-Dominant Logic premise that value is co-created through continuous interaction between firms and customers.

Although research has been undertaken globally on the relationship between SQ and CX, empirical studies within the Zimbabwean and the broader Sub-Saharan African telecommunications context remain limited (Manuere *et al.*, 2021). Musungwini *et al.* (2014) confirm that existing literature emanates primarily from studies carried out in developed economies, where infrastructure, regulatory frameworks, and consumer expectations differ from those in Sub-Saharan Africa, Mhlophe and Chinjova (2022) agree that there is lack of data-driven investigations into how SQ and CX interact and influence customer engagement, retention, and loyalty. Viriri and Phiri (2017), too, indicate that few studies in the region adopt bidirectional or recursive models that treat SQ and CX as mutually reinforcing constructs. This gap is critical, given the dynamic and often volatile operating environments that necessitate context-specific insights. Addressing this gap could offer a localised understanding of value co-creation and inform strategies for customer-centric innovation and service delivery.

Co-creation of Value in Telecommunications

Yusof and Rahim (2024) view co-creation of value as the collaborative development of service experiences through continuous contact between consumers and providers of these services. Customers are active participants in influencing and evaluating service outcomes and within the telecommunications industry (Manser Payne *et al.*, 2021). SQ and CX are better understood as interactive and dynamic

constructs, rather than unidirectional or cause-effect variables (Yrjola *et al.*, 2022). Correa-Gonzalez (2022) also opines that high SQ positively influences experiences, expectations, and feedback which, in turn, influences perceptions of quality, creating a mutual value-building scenario. In the quest to understand co-creation, measuring the reciprocal influence between SQ and CX using analytical tools such as structural equation modelling enables researchers to capture bidirectional effects and interdependencies. Direct user feedback is pivotal, as it shapes service delivery. This approach aligns with the S-D Logic Theory, which posits that value is not embedded in the product, but continuously co-created through interaction and context-specific engagement. Literature highlights a shift from linear to interactive models of understanding SQ and CX, reflecting the broader move towards co-creation of value in contemporary service environments. Studies support the view that high SQ enhances CX, while rich experiences reshape expectations and redefine perceptions of quality, forming a strong relationship. The review underscores the need for quantitative research that empirically tests the mutual influence between SQ and CX, particularly in emerging markets. This sets the stage for the present study, which seeks to bridge this gap by investigating how these constructs interact to co-create value in Zimbabwe's mobile telecommunications industry.

Results and Discussion

Response Rate

Table 1 indicates that out of a sample of 370 questionnaires sent out to participants, 313 responses were returned, resulting in a high response rate of 85%, which is commendable for a survey-based study. Of the questionnaires returned, 7 were deemed unusable as they were incomplete and owing to quality-related issues such as pattern responding, missing responses, and multiple selection. The remaining 306 valid and coded responses represented 83% of the total sample. The unreturned rate of 15% falls within acceptable limits and does not significantly undermine the robustness of the dataset. The response rate is also sufficiently high to enhance the reliability and generalisability of the study's findings, especially given its geographical spread across Zimbabwe's ten provinces.

Table 1. *Survey Response Rate*

Category	Number of respondents	Percent (%)
Total survey sample	370	100
Total returned	313	85
Unused	7	2
Unreturned	57	15
Total coded samples	306	83

Preliminary Exploratory Factor Analysis

Reliability

Cronbach's Alpha Test

As presented in Table 2, the reliability of the measurement scales was assessed using Cronbach's Alpha coefficient, which measures internal consistency among items within each construct. A Cronbach's Alpha value above 0.6 is generally considered acceptable for exploratory research (Sreejesh *et al.*, 2014). The results indicate that all SQ and CE components achieved acceptable levels of reliability, with coefficients exceeding the 0.6 threshold, except for the Reliability component.

Within the SQ dimensions, Tangibles ($\alpha = 0.67$), Responsiveness ($\alpha = 0.762$), Assurance ($\alpha = 0.754$), and Empathy ($\alpha = 0.64$) demonstrated satisfactory internal consistency. However, the *Reliability* component ($\alpha = 0.294^*$) fell below the acceptable limit, leading to its exclusion from subsequent analyses, as indicated by the asterisk in Table 2. Similarly, all CX components exhibited strong reliability, with Cronbach's Alpha coefficients ranging from 0.684 (Leisure) to 0.863 (Joy), confirming the internal consistency of these constructs. Overall, the results support the adequacy and reliability of the measurement scales, justifying their inclusion in further factor analysis.

Table 2. Cronbach's Alpha Test values for SQ Variables

SQ		
Component	Number of Items (N)	Cronbach's Alpha
Tangibles	3	0.67
Reliability	4	0.294*
Responsiveness	4	0.762
Assurance	4	0.754
Empathy	7	0.64
CX		
Component		
Joy	3	0.863
Mood	3	0.859
Leisure	3	0.684
Distinctiveness	3	0.851

Using the Cronbach Alpha test for reliability, all SQ attributes were deemed reliable, except the "reliable variable", which had a Cronbach Alpha of 0.294 that was below the cut-off of 0.64. With regards to CX, since all other attributes had a Cronbach's Alpha above 0.64, they were deemed reliable.

Sample Adequacy

After reliability tests, the sample adequacy was measured. According to Sreejesh *et al.* (2014), sample adequacy denotes the extent to which the variance in the

observed variables is attributable to underlying factors. Higher sample adequacy values with 1.0 being the highest indicate the suitability of the data for factor analysis. Harrison *et al.* (2020) further posit that an adequate dataset is one that affords the researcher the capacity to formulate sound judgments and derive valid and reliable interpretations from the analysis.

Kaiser-Meyer-Olkin (KMO test)

Table 3. *Kaiser-Meyer-Olkin Test Values*
SQ

Component	Number of Items (N)	Keiser Meyer-Olkin Test (KMO)
Tangibles	3	0.608
Reliability	4	Case deleted*
Responsiveness	4	0.757
Assurance	4	0.749
Empathy	7	0.795
CX		
Component	Number of Items (N)	Keiser Meyer Test
Joy	3	0.735
Mood	3	0.720
Leisure	3	0.661
Distinctiveness	3	0.725

To assess the suitability of the dataset for factor analysis, the Kaiser-Meyer-Olkin (KMO) Test and Bartlett's Test of Sphericity were performed. These tests evaluate sampling adequacy and the extent of intercorrelations among variables. According to Sreejesh *et al.* (2014:217), a KMO value greater than 0.6 is considered the minimum acceptable threshold, indicating sufficient sampling adequacy for factor extraction. Likewise, a significant Bartlett's Test ($p < 0.05$) confirms that the correlation matrix is not an identity matrix, thus validating the appropriateness of factor analysis.

As shown in Table 3, the KMO values for the SQ components ranged from 0.608 (Tangibles) to 0.795 (Empathy), demonstrating acceptable to good sampling adequacy across the constructs. The *Reliability* component was marked as "Case deleted", which suggests that the computation could not be performed, possibly due to issues such as missing data, insufficient variance, or multicollinearity among its items. The CX components also exhibited satisfactory KMO values, ranging from 0.661 (Leisure) to 0.735 (Joy), further confirming the adequacy of the sample for factor reduction analysis.

Bartlett Test

Bartlett's Test of Sphericity assesses whether the correlation matrix among variables that is testing whether the variables share sufficient correlations to justify the use of factor analysis. A significant p-value ($p < 0.05$) indicates that the correlations between items are statistically significant, and that factor analysis is appropriate for the dataset. In Table 4, Bartlett Test for all components SQ and CX yielded p-values of 0.00, which are well below the 0.05 threshold. This suggests that there are strong interrelationships among the items within each component, confirming the suitability of the data for factor reduction or exploratory factor analysis. The only exception is the Reliability component, where the Bartlett's Test value is listed as CD* (Computation Disabled) because the case was deleted during Kaiser-Meyer-Olkin test.

Table 4. Bartlett Test Values

SQ Components		
Component	Number of Items (N)	Bartlett Sphericity Test (P Value)
Tangibles	3	0.00
Reliability	4	CD*
Responsiveness	4	0.00
Assurance	4	0.00
Empathy	7	0.00
CX components		
Component	Number of Items (N)	Bartlett Sphericity Test
Joy	3	0.00
Mood	3	0.00
Leisure	3	0.00
Distinctiveness	3	0.00

Factor Extraction or Reduction Analysis

The extraction method used for this study was principal axis factoring. According to Apuke (2017), principal factor analysis is appropriate for identifying latent constructs, rather than simply reducing the data. Since the study research question focused on the dimensions behind the variables, it was appropriate to use principal axis factoring. In each of the attitude components, factor reduction or factor analysis was carried out with the aid of an R Matrix (rotational matrix) to reduce data from a group of interrelated variables to a smaller set of factors. This was done to achieve parsimony by explaining the maximum amount of common variance in a factor correlation matrix using the smallest number of explanatory constructs for each component. A factor loading or factor score matrix with factor correlation coefficients for each component was then constructed, indicating the relationships between each variable in each component.

Table 5. Factor Reduction and Extraction Output

Component	SQ				
TANGIBLES	Factor	Eigen value	% Variance	Factor matrix	Factor significance
Up-to-date equipment and technology	1	1.82	60.679	0.611	b*
Physical facilities	2	0.738	24.585	0.891	a*
<i>visually appealing</i>					
<i>Well-dressed workers</i>	3	0.442	14.736	0.466	c
RESPONSIVENESS	Factor	Eigen value	% Variance	Factor matrix	Factor significance
<i>Provides timeous service</i>	1	2.339	58.475	0.742	b*
<i>Keeps accurate records</i>	2	0.714	17.581	0.559	d
<i>Tells exact service time</i>	3	0.401	12.49	0.759	a*
<i>Prompt service</i>	4	0.299	11.184	0.613	c*
ASSURANCE	Factor	Eigen value	% Variance	Factor matrix	Factor significance
<i>Employees willing to help</i>	1	2.312	57.799	0.664	b*
<i>Employees not too busy to help</i>	2	0.710	17.756	0.559	d
<i>Employees trustworthy</i>	3	0.532	13.298	0.767	a*
<i>Customer feels safe</i>	4	0.446	11.147	0.655	c*
EMPATHY	Factor	Eigen value	% Variance	Factor matrix	Factor significance
Employees polite	1	2.952	42.177	0.542	e
Institution supports employees	2	1.017	14.532	0.168	g
Individual employee attention	3	0.907	12.952	0.732	b*
Personal attention given to customer	4	0.722	10.312	0.793	a*
Employees know their job	5	0.644	9.205	0.709	c*
Employees appreciate customers (interest)	6	0.434	6.917	0.614	d*
Customer convenient operating hours	7	0.324	4.625	0.317	f

Component			CX		
JOY	Factor	Eigen value	% Variance	Factor matrix	Factor significance
Pleasurable exp.	1	2.355	78.492	0.822	b*
Satisfying exp.	2	0.348	11.603	0.850	a*
Engaging exp.	3	0.297	9.905	0.797	c*
MOOD	Factor	Eigen value	% Variance	Factor matrix	Factor Significance
Good exp.	1	2.348	78.259	0.759	c*
Happy exp.	2	0.394	13.129	0.900	a*
Exciting exp.	3	0.258	8.612	0.805	b*
LEISURE	Factor	Eigen value	% Variance	Factor matrix	Factor significance
Refreshing exp.	1	1.886	62.866	0.778	a*
Relaxing exp.	2	0.627	20.897	0.618	b*
Delightful exp.	3	0.487	16.237	0.606	c*
DISTINCTIVE	Factor	Eigen value	% Variance	Factor matrix	Factor significance
Unique exp.	1	2.314	77.145	0.778	c*
Memorable exp.	2	0.389	12.953	0.868	a*
Wonderful exp.	3	0.297	9.903	0.787	b*

Factors marked * were retained for further analysis. Each alphabetical letter denotes a corresponding hierarchical ranking, with a* indicating the highest value for each component and tangible or attribute. The cut-off point for the factors was 0.60> for each component. A total of 24 variables (12 in the Customer SQ component and 12 in the CX component) were retained for further regression analysis and structural model development after factor extraction, as indicated in Table 5.

Regression Analysis

Based on the retained 24 variables for each attitude component, multiple regression analyses were carried out using the generalised linear model (GLM) to determine the best possible combination of variables to explain the relationships between SQ and CX in the mobile telecommunications sector. Taking CX that the firms offered as the explanatory or independent variables (which they could manipulate to offer what they term the best service available), and the CX and satisfaction responses as the dependent variable, the following significant relationships were noted. The study results (Table 6) indicate that for the three

telecommunications firms assessed, having up-to-date equipment and technology induced significant ($p < 0.05$) good experiences in customers ($p < 0.041$). Customers derive significant ($p < 0.05$) pleasurable experiences (C4, $p < 0.000$) from dealing with a firm that tells them exactly when the service will be provided. Moreover, customers indicate that they had significant ($p < 0.05$) satisfying ($p < 0.001$), engaging ($p < 0.001$), good ($p < 0.014$), happy ($p < 0.016$), and refreshing ($p < 0.038$) experiences when the mobile telecommunications firm they were dealing with communicated clearly and precisely and honored service delivery deadlines. Customers reported significantly engaging ($p < 0.041$) and unique ($p < 0.038$) experiences when the mobile telecommunications firm tells them exactly when the service will be performed. Furthermore, customers had significantly good ($p < 0.002$) and exciting experiences ($p < 0.003$) when the mobile telecommunications firms provided prompt services. Customers had significant ($p < 0.05$) happy ($p < 0.0032$), exciting ($p < 0.021$), relaxing ($p < 0.007$), delightful ($p < 0.021$) and wonderful ($p < 0.012$) experiences when they perceived that the mobile telecommunication firm's employees they were dealing with were trustworthy. Moreover, customers indicated that they had significant ($p < 0.05$) satisfying ($p < 0.032$) and exciting experiences ($p < 0.048$) if they felt safe when dealing with employees of firms they trusted. When customers perceived that the institution's employees knew exactly what their needs were, they reported having significantly ($p < 0.05$) engaging ($p < 0.000$), well/good ($p < 0.003$), refreshing ($p < 0.018$), and memorable ($p < 0.019$) experiences. Customers had happy experiences ($p < 0.043$) when they perceived that an institution had convenient operating hours.

For the other extracted explanatory SQ variables – a company with visually appealing physical facilities, the firm's employees are always willing to help customers, give me individual attention, and give me personal attention – there were no significant relationships ($p > 0.05$) with any of the assessed CXs' covariates. It should be indicated, however, that the absence of a statistically significant relationship between any of the extracted explanatory customer SQ variables and the dependent CX covariates does not always imply that there is no qualitative relationship.

Table 6. *Regression Output for Customer SQ and CX*

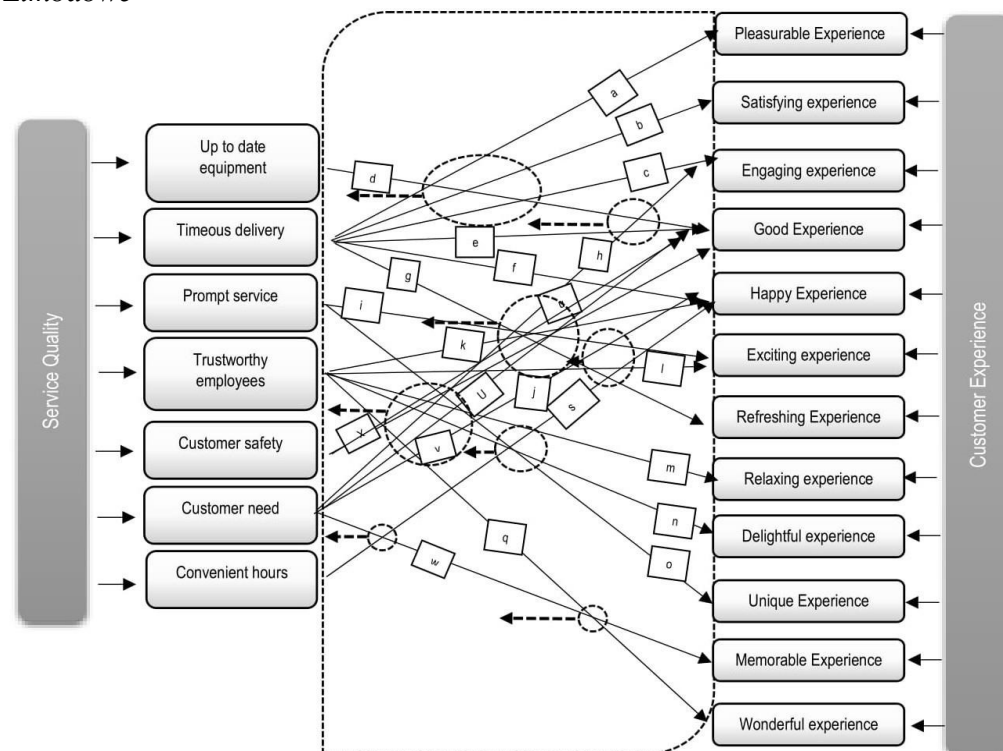
Independent/Explanatory variable	Dependent variable	P value
Up to date equipment and technology	Institution provides good experience (C4)	0.041
The institution tells the customer exactly the time service will be performed	Pleasurable experience (C1)	0.000
	Satisfying experience (C2)	0.001
	Engaging experience (C3)	0.001
	Good/well experience (C4)	0.014
	Happy experience (C5)	0.016
	Refresh experience (C7)	0.038
The institution tells the customer exactly when the service will be performed	Engaging experience (C3)	0.041
	Unique experience (C10)	0.038
The institution provides prompt service	Good /well experience (C4)	0.002
	Exciting experience (C6)	0.003
The institution's employees are trustworthy	Happy experience (C5)	0.032
	Exciting experience (C6)	0.021
	Relaxing experience (C8)	0.007
	Delightful experience (C9)	0.021
	Wonderful experience (C12)	0.012
I feel safe when conducting transactions with the institution's employees	Satisfying experience (C2)	0.032
	Exciting experience (C6)	0.048
The institution employees know what my needs are	Engaging experience (C3)	0.000
	Good experience (C4)	0.003
	Refreshing experience (C7)	0.018
	Memorable experience (C11)	0.019
The institution has convenient operating hours	Happy experience (C5)	0.043

Structural Equation Development (modelling)

The study constructed a point intervention, structural cause-effect relationship model/framework (a mediated Structural Equation Model, SEM), as indicated in Figure 1. Figure 1 derives from the interlinkage of the significant relationships between the explanatory SQ variables, and the dependent, often resonant, and stochastic CX revealed by the regression analysis shown in Table 7. Figure 1 indicates common interlinkages of both explanatory variables – (customer SQ) e.g. The institution provides service by the time promised, the institution's employees are trustworthy, and the institution's employees know what my needs are – and dependent CX variables e.g. Pleasurable experience, Good /well experience, amongst others.

The results revealed a lack of significant quantitative relationships among key marketing aspects. These include ambience, reflected in the visual appeal of a firm's physical facilities; customer care, demonstrated by employees' willingness to assist customers; and individualised attention, which is a critical element of SQ and care in marketing. Additionally, positive customer perceptions, as represented by CXs, were not strongly related to these factors. This finding suggests the need for a paradigm shift in the traditional marketing strategies adopted by telecommunication companies in Zimbabwe. Figure 1 above indicates a mediated two-way exchange of feedback from SQ impacting CX, and vice versa, representing the use of CX (positive or negative) to fine-tune the SQ. The mediatory pathways and information switch nodes (circles and rectangles) forms crucial aspects of a reversible relay of information. This indicates that rather than considering customer SQ as input, any established firm should view it as a reversible flexible controller of CX, which is informed and shaped by the CXs themselves, as indicated by the reversible and dotted arrows in Figure 1.

The dotted reversible lines inform the firms about the extent and significance of flexibility in customer SQ relies on CXs. This suggests that there is a > 6-step (3 forward arrows and 3 backward dotted and reverse arrows) mediation pathway between SQ and CX. The mediatory or node switches (depicted as circles or rectangles) represent the managerial component, which encompasses the key decision-making functions and personnel that can either strengthen or weaken the competitive foundation of Zimbabwe's highly competitive telecommunication industry. The results of the study suggest the emergence of a new paradigm shift, in which customer care is no longer the sole or primary determinant of CX. Instead, it forms part of a broader and more intricate set of customer service covariates, shaped by both precedent and antecedent customer experiences. This evolving perspective underscores the need for a dynamic and integrative approach to the delivery of SQ. These SQ provisions are meant to generate profitable, recurrent, and mutually beneficial customer experiences. This approach highlights the importance of strategic management and well-designed operational practices, emphasizing that the competitive success of telecommunication firms in Zimbabwe relies not on isolated service components, but on the synergistic alignment of all aspects of customer interaction and engagement.

Figure 1. Relationship between SQ and CX in the Telecommunications Sector of Zimbabwe**Table 7.** Key to Framework

Service quality variable	Customer experience variable	Letter	P-value
Timeous delivery	Pleasurable experience	A	0.00
	Satisfying experience	b	0.001
	Engaging experience	C	0.001
	Good experience	E	0.014
	Happy experience	F	0.002
	Refreshing experience	G	0.038
Up to date equipment	Good experience	D	0.041
Prompt service	Exciting experience	I	0.002
	Unique experience	0	0.002
Trustworthy employees	Happy experience	k	0.032
	Exciting experience	l	0.021
	Relaxing experience	m	0.007
	Delightful	n	0.021
	Wonderful experience	g	0.012
Customer safety	Good experience	X	0.002
	Exciting experience	j	0.048
Customer needs	Engaging experience	h	0.000
	Good experience	u	0.003
	Happy experience	v	0.018
	Memorable experience	w	0.019
Convenient hours	Happy experience	t	0.043

The structural framework depicts how, in the Zimbabwean mobile telecommunications sector, timely delivery is also the strongest determinant that is significantly ($p < 0.05$) related to six components, namely: pleasurable, good, satisfying, engaging, happy and refreshing experiences. Having trustworthy employees is the second strongest SQ component, which significantly relates to five components of CX: happy, exciting, relaxing, delightful and wonderful experiences. The framework also indicates that convenient operating hours are significantly ($p < 0.05$) correlated to a happy experience only. Customer safety relates well to good and exciting experiences, while appreciation of customer needs significantly ($p < 0.05$) relates to engaging, good, happy and memorable experiences. Prompt service supports exciting and unique experiences, whereas having up-to-date equipment has the least influence affecting good experience only.

In the mobile technology industry in Zimbabwe, good experience is the most valued experience variable, with five components associated with it: up-to-date equipment, timely delivery, trustworthy employees, customer safety and convenient hours. Happy experience is associated with timely service delivery, trustworthy employees and convenient hours, while exciting experience is linked with prompt service, trustworthy employees and customer safety. Engaging and refreshing experiences are associated with two SQ variables each, while pleasurable, satisfying, relaxing, delightful and unique experiences are associated with one SQ variable only (Table 7). The findings of the current study are at variance with studies conducted elsewhere. Sah *et al.* (2025), for example, emphasize that traditional marketing and customer SQ and care are the key drivers affecting the CX, and ultimately sales and profits.

This study appears to suggest that traditional marketing and customer quality care are not the key priorities for the mobile network customers in Zimbabwe. Hence the need to investigate the key drivers of customer satisfaction from a non-traditional perspective for these customers. The framework developed in this study identifies the critical hotspots, which are delineated by broken lines in Figure 1. The figure further illustrates the intervention points, indicated by broken arrows, where strategic adjustments to SQ can effectively influence corresponding CX within the context of Zimbabwean telecommunication firms. The emphasis is on re-examining the interrelationships of the explanatory variables for each firm and establishing the presence of internal validity and non-conformity of errors or residuals and outliers as represented by unique products or services borne out of the need to have competitive advantage. This entails re-examining all explanatory variables from both the quantitative and qualitative perspectives. Several scholars (Kim & Kim, 2022; Manser Payne *et al.*, 2021; Shyju *et al.*, 2023; Sorooshian, Salimi, Salehi, *et al.*, 2013; Tjahjaningsih *et al.*, 2021) researched the relationship between SQ and CE and came up with different frameworks.

The current study revealed a close link between SQ and CX in Zimbabwe's mobile telecommunications sector. It also established the relationship between the SQ variables and CX variables. The assertion by Sukendi *et al.* (2021) only highlighted that SQ is affected by CX, while the current study suggests an inter-reliant relationship between SQ and CX. The model by Sorooshian *et al.* (2013) in the Iranian context only showed the link between SQ and the four elements of CX, without showing a relationship

between SQ and SX elements. García-Pascual *et al.* (2023) also highlight that organizations should concentrate on pragmatic experience, sociability experience, usability experience and hedonic experience in a quest to improve SQ.

The current study stresses that the link between SQ and CX is bidirectional, suggesting the two variables should co-exist and be mutually dependent. Kim and Kim (2022) conclude that customers' experiences specified by lengths of relationships with a service provider and frequency of service use do not influence all aspects of SQ. Koo *et al.* (2021) also highlight that longitudinal experiences affect expectations of service assurance perceptions relating to reliability and responsiveness, and the quality gap relating to assurance. The study by Kim and Kim (2022), Koo *et al.* (2021) and the current study use different variables to describe the relationship between SQ and CX, showing that the interdependence of the variables is common. Kadlubek and Grabara (2015), meanwhile, bring in the divergent view that customer expectation and CE affect SQ.

The present study agrees with the one by Tran C Nguyen (2022) that CX also affects SQ. However, the current study highlights a two-way link between the variables, differing significantly from the major findings by Kadlubek (2015). This study shows that SQ is the difference between what the customer was expecting and what they experienced, meaning that managers – in their quest to improve SQ – should always seek to minimize the gap between customer expectations and customer experience. Moreira *et al.* (2017), meanwhile, indicate that brand experience directly affects satisfaction, loyalty, trust and quality. According to their model, marketers should manage brand experiences, SQ, satisfaction and trust to build customer loyalty. This model does not clearly define the exact relationship between SQ and CX and relies on other elements such as satisfaction and trust. It is important to establish the relationship between the two variables (trust and satisfaction), which are complex and determine their overall influence on CX, to come up with appropriate interventions. Even though the current study outlines the actual relationship between the SQ and CX, it also acknowledges that good SQ and CX lead to customer satisfaction. Where Moreira *et al.* (2017) view trust because of SQ, the current study looks at trustworthiness as a variable that reflects SQ. Amoah *et al.* (2016) introduce another aspect of experience quality, which the authors acknowledge is determined by hedonics, peace of mind, recognition and involvement, leading to satisfaction. This model by Amoah *et al.* (2016) does not clearly outline the association between SQ and CE. Instead, it introduces a concept that needs to be backed by a relation matrix to explain the link between the variables, as highlighted by current study.

Shrivastava (2017) acknowledges that the following attributes of CX affect online retail quality: customer awareness, economic value, customer support, security, fulfilment, personal attention, network customization and website visibility. The current study results unravel the relationship between SQ and CX variables. More significantly, this enables the researcher to determine specific items that are connected within this relationship. The results also reflected hotspots, or areas where the variable has significantly high interrelationships with dependent variables, as shown by the intersecting cross lines in Figure 1. These hotspots also revealed intervening points that will provide feedback or points of reference in realigning SQ. The results of the current

study also revealed that SQ and CX are interrelated and affect each other. Consequently, the implementation of SQ and CX is inherently interdependent, requiring that both be executed in a coordinated manner. Each component should inform and reinforce the other to ensure the delivery of an enhanced and cohesive service offering.

Conclusion

The study reflects on the critical role of SQ and CX as interdependent drivers in the co-creation of value within the mobile telecommunications sector. Instead of approaching these two aspects independently, the research results reflect a symbiotic relationship, where improvements in SQ enhance CX, and the resultant enriched experiences, in their turn, raise customer expectations and shape perceptions of quality. This study is a quantitative validation of the relationship between SQ and CX, particularly in emerging markets like Zimbabwe, where contextual factors may influence how these constructs interact. Despite the growing emphasis on SQ and CX in marketing literature, few studies have empirically examined their mutual influence, particularly in the context of telecommunications in emerging markets such as Zimbabwe. This study seeks to address this gap by investigating how SQ and CX interact, thereby contributing to the theoretical development of Service-Dominant Logic and Experiential Marketing Theory, while also providing practical insights for telecom service providers operating in similar markets. The study reflects a mediated two-way exchange between service quality and customer experience. It also reveals a new paradigm shift where customer care is no longer the key driver or imperative factor in determining customer experiences, but rather, part of a complex package of well-thought-out customer service covariates informed by precedent and antecedent customer experiences. While revealing that SQ has an impact on CX, the results show that customer experience also informs and shapes SQ. The study also highlights that the variables of SQ and CX exert varying degrees of influence on one another. This insight emphasizes the need for managers to identify the most impactful variables in each context to make more informed and effective strategic decision-making.

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New Horizons of Knowledge Management, based on Inner Knowledge

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Using a historical analysis of intelligence theories, the study aims firstly to identify whether the abilities related to the Inner Knowledge Management (IKM) model are connected to one or more types of intelligence. Secondly, this study seeks to investigate if there are IKM abilities that are not connected to any intelligence theories. Lastly, the study aims to show that certain IKM abilities that have never been described in any previous intelligence theory could be the base for a new type of intelligence named Conscious Intelligence. To conclude, the study proposes that this new type of intelligence could be positioned between the Emotional and Spiritual intelligence theories. The study is limited to theories developed in the last two centuries.

Keywords: *Intelligence theories, Inner Knowledge, Inner Knowledge Management, Decision- making process.*

Introduction

As a human creation, *knowledge* is a wide, universal, and evolving idea that is somehow connected to an unreachable and infinite truth. A wide variety of definitions of what knowledge is have been proposed. For example, old philosophy schools divide knowledge into *propositional knowledge*, *know-how knowledge*, and *knowledge by acquaintance* (Hetherington, 2022). To understand what knowledge is, analytical philosophers studied, divided, and identified the essential and definitive components of knowledge. With some divergences, even nowadays, the disagreements revolving around what knowledge is, have to do with two aspects. Firstly, the possibility that a part of what is true can be fully reached by our limited thought processes. Secondly, the degree of certainty that is required to prove that something has been fully comprehended and integrated by someone. Scientific literature related to the theory of knowledge analyzes knowledge by its components. The justified true belief theory (JTB) proposes that knowledge is a justified true belief, which is seen by many philosophers as the standard definition (Zagzebski, 2017). Other scholars argue that knowledge could be defined by common elements that are shared among diverse forms of knowledge. This, for example, could be that, for knowledge to happen, there must be some kind of awareness (Silva, 2019). Despite all

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disagreements, most scholars agree that knowledge can be obtained by different paths. Although perception through the senses has been determined as one of the main sources for the gaining of knowledge, many theorists also include introspection, intuition, deduction, induction and abduction, memory, and testimony.

Within the business realm, knowledge, and especially *Knowledge Management* (KM) has been crucial to organizational success. Organizational performance pressure, fierce competition and lack of ethical leadership since COVID (Ngcobo & Reddy, 2024) push companies to explore new types of knowledge. Although in this domain knowledge has been mainly objective, in 2022 Flor *et al.* suggested that a new type of knowledge, called *Inner Knowledge* (IK), whose components were mainly unconscious and subjective, should also be considered for individual and organizational success.

In 2023, the same authors proposed a new model called *Inner Knowledge Management* (IKM) that allowed people within organizations to manage IK to improve the workers' efficiency, motivation, and satisfaction (De la Flor, *et al.*, 2023). The findings of this research highlighted that by coaching and training workers on the acquisition and management of *Inner Knowledge* through IKM, individuals could increase their efficiency, motivation, and satisfaction. The study proved that the IKM model would help individuals transform negative emotions into balanced ones and limiting beliefs into objective knowledge. On top of that, the findings suggested that IKM helps individuals develop several abilities related to a few types of intelligence. These included the ability to have a global vision, the ability to communicate positively with others and be a good listener, the ability to be empathetic towards others, the ability to feel serene when making decisions, and the ability to feel self-assured.

Furthermore, human intelligence is a term largely related to knowledge, as human intelligence has been connected to the human capacity for introspection, intuition, deduction, induction, abduction, and memory, amongst others. Intelligence, defined as, "the intellectual capability of humans to acquire and manage knowledge marked by complex cognitive abilities and a certain level of motivation and awareness" (Tirri and Nokelainen, 2012) has been studied by several intelligence theories that have measured different human capacities to acquire and manage knowledge.

One of the first methods to measure how efficiently individuals acquire and manage knowledge was the *Intelligence Quotient* test (IQ) (Brody, 1999). This test would measure some variables or factors including understanding and remembering concepts, learning new concepts, applying logic and reason, recognizing patterns, planning, innovating, solving problems, and making decisions, amongst others. Although IQ tests were very popular, they only measured abilities that were related to objective data, and therefore they were also limited. With time, different authors developed new intelligence theories that included abilities that allowed individuals to acquire and manage subjective knowledge. This is the case of *Emotional Intelligence theories* which study human abilities that allow individuals to acquire and manage knowledge with emotional components, *Social Intelligence theories* which study human abilities that allow individuals to acquire and manage knowledge with social components, or *Spiritual Intelligence theories* which study human abilities to acquire and manage different types of knowledge with spiritual components.

Purpose & Innovation of Research

Since all the objective and subjective components described in the various types of intelligence are mostly conscious and objective, and many of the abilities developed through the IKM model allow the acquisition and management of unconscious and subjective components, the purpose of this article is first to carry out a conceptual analysis of the different theories of intelligence from the traditional *Cognitive Intelligence*, *Emotional Intelligence*, and *Multiple Intelligences* theories to the most modern theories of intelligence such as *Spiritual Intelligence*. Secondly, its purpose is to analyze and compare the abilities and competencies developed by each of these theories to those capabilities described by the IKM model to see if the IKM capabilities are related to a particular type of intelligence or, on the contrary, if those capabilities can be considered a new type of intelligence.

The innovation of this research is based on the study of the everlasting subjective components that are contained within human knowledge that affect scientific disciplines such as Knowledge Management. Innovation lies firstly in the object of study: the nature of the components contained in the abilities described by the various types of intelligence; and, secondly, in the questions of the research. Developing this latter point further, as if certain IKM abilities allow individuals to manage subjective and unconscious components that could not be managed otherwise, how could IKM be used to eliminate subjective elements from decision-making processes increasing the level of efficiency in a wide variety of fields, including at economic, social, educational and political level.

Research Paradigm, Method, Questions and Assumptions

Research paradigm: Different intelligence theories have measured numerous abilities, factors, or variables to define various types of intelligence to manage knowledge. Traditional theories of intelligence focus on cognitive abilities that measure objective knowledge such as mathematical or verbal skills, memory, or problem-solving abilities. More modern theories of intelligence also consider abilities that manage subjective knowledge such as the ability to understand or communicate emotions, the ability to care about others, or the ability to see the spiritual realm in day-to-day life. This is the case of *Emotional Intelligence* (Killian, 2012), *Social Intelligence* (Gilbert, 2019), or *Spiritual Intelligence* (Currie, 2023). Nevertheless, no intelligence theories have considered the management of knowledge with unconscious components such as the one contained in Inner Knowledge.

Research method: Based on qualitative research, the study measures 21 intelligence theories developed in the last 100 years. The methodology uses empirical research, analyzing human capabilities described in these theories as well as their components. This methodology, widely applied among classical researchers, has been rated as the most interesting research method by several authors and has been used in the most cited articles of the Academy of Management Journal (Eisenhardt, 1989). Although the data is qualitative, the statistical research methodology is quantitative.

In order to create a relatively homogeneous group in the study, the inclusion criteria were intelligence theories developed in the last century, that describe human capabilities that are related to knowledge management. The exclusion criteria were theories that do not relate to knowledge management or that do not describe human capabilities such as the *Animal Intelligence theories*.

Theories were categorized by their scopes and type of knowledge processed: cognitive theories relate to cognitive mental processes; emotional theories relate to emotional mental processes; and so on. The study measured the number of theories, the number of capabilities described by each theory, and the number of components described in each capability.

The study was carried out in three phases.

- The initial phase of the study included research of all intelligence theories that relate to Knowledge Management.
- The second phase of the study included the investigation of the different capabilities described in each intelligence theory.
- The third phase of the study included the description of the components implied in each capability described by each intelligence theory.

Research Questions

1. Are the IKM capabilities related to a particular type of intelligence?
2. If not, can those IKM capabilities be considered a new type of intelligence?

The research hypotheses (H) were as follows:

H1 “Intelligence theories describe human abilities that relate to objective knowledge, and some are related to IKM”.

H2 “Intelligence theories describe human abilities that relate to objective & subjective knowledge, and some are related to IKM”.”.

H3 “Intelligence theories describe human abilities that relate to objective & subjective conscious knowledge, and some are related to IKM”.”.

H4 “Intelligence theories describe human abilities that relate to objective & subjective conscious and unconscious knowledge, and some are related to IKM”.

Research assumptions: The research assumptions are as follows:

1. Some intelligence theories describe capabilities that contain subjective elements
2. Some IKM capabilities are described in intelligence theories
3. Some IKM capabilities are not described in intelligence theories

Literature Review

In 1904, Charles Spearman, a British psychologist interested in intelligence and human aptitudes introduced the term *General Intelligence* or *G-Factor* which

described a "bifactor theory of intelligence". In his theory, Spearman claimed that any measure of intelligence could be divided into two components, a common or generic one called "G" and a specific one called "S".

The "G" factor would have a generic action (G) that extends to all individual cognitive abilities and is genetically loaded (Marsman & Rhemtulla, 2022). The "S" factor would be related to a specific component (S) such as a skill. Intelligence quotient (IQ) tests were then designed to measure both factors and had a psychometric approach. They traditionally measured mathematical skills, verbal skills, spatial visualization, and memory amongst other things.

Although a few authors stated that IQ tests did not measure non-intellectual abilities and that these needed to be included if they wanted to be efficient (Wechsler, 1943), since 1950 the psychometrics subfield has grown exponentially and nowadays IQ tests are based on psychological constructs that include a wide concept of what "intelligence" is, what a "mental disorder" is, or a "personality trait". A system has now developed where a wide number of behavioural, cognitive, environmental, and biological factors are complexly interconnected and measured (Heeren *et al.*, 2023). The *Cognitive development theory*, first defined in 1919 by Jean Piaget, studied the nature and development of human intelligence focusing on the nature of knowledge itself. Piaget studied how humans gradually acquire, construct, and use knowledge demonstrating that children process information in a different way than adults do (Sanghvi, 2020). Piaget proposed four different stages of cognitive development stating that children construct and understand the world in a different way than adults do. According to Piaget, children experience discrepancies between what they already know and what they discover in their environment, and then adjust their ideas accordingly (McLeod, 2007).

In 1920 the term *Social Intelligence* was used for the first time by Edward L. Thorndike. This intelligence was related mainly to two capabilities: understanding and to motivate others (Thorndike & Stein 1937). From 1950, authors such as Maslow (1950), Beldoch (1964) and Leuner (1966) started mentioning a new type of intelligence called *Emotional Intelligence* which related to various personal abilities with an emotional component. These included the ability of individuals to recognize their own and others' emotions, to discern between different feelings, labelling them appropriately, and the ability to use this emotional information to guide thinking and behavior. In 1963, Raymond Cattell designed a new theory to describe intelligence. According to Cattell, intelligence was formed by a *fluid factor of intelligence* (Gf) and a *crystallized factor of intelligence* (Gc). Gf was related to data comprehension, problem solving, and learning abilities and Gc was related to the capacity to deduce abstract relational problems (Brown, 2016). In 1966, Das, Kirby and Jarman created a new theory called the *PASS Theory of Intelligence*, arguing that there are four basic dimensions of intelligence which included *Planning*, *Attention*, *Simultaneous cognitive processing*, and *Successive cognitive processing* (Das & Kirby 2022).

Gardner, in 1983, proposed that there were multiple intelligences and that some abilities that had been studied in clusters needed to be pinpointed as a single type of intelligence. This was the case of what he called the *Logical Mathematical/Spatial intelligence* (that included mathematical and spatial skills), *Linguistic intelligence*

(that included verbal and communication skills), Intrapersonal-Interpersonal intelligence (that included abilities to connect with oneself and others), Musical intelligence (that included musical skills) or Kinaesthetic intelligence (that included kinaesthetic skills). A few years later, in 1995, Gardner added a new type of intelligence called the *Naturalistic intelligence* that related to the ability to connect to and respect nature, and lastly, in 1999, he added the *Existential intelligence* which related to the ability to resolve existential human issues (Shearer, 2019). In 1984, Stenberg created the *Triarchic Theory of Intelligence*. This theory differentiated abilities into three groups: analytical, creative, and practical, using three types of components: performance components (by perceiving problems and being aware of relationships between different data), meta-components (by solving problems) and knowledge-acquisition components (by acquiring new knowledge) (Zajda, 2019). In 1990, a new type of intelligence was defined by Zohar as *Spiritual Intelligence*. Zohar related this type of intelligence to several human abilities that included: self-awareness, spontaneity, whether being vision and value-led, holism, compassion, celebration of diversity, field independence, humility, the tendency to ask fundamental "why?" questions, the ability to reframe, the positive use of adversity, and having a sense of vocation (Vasconcelos, 2020).

In 1993, John Carroll developed the *Three-stratum Theory of Intelligence*. According to him, intelligence abilities needed to be classified in three stratum. These were the narrow abilities, the broad abilities and a general cognitive factor. Later, Carroll, together with Cattell and Horn, developed the Cattell-Horn-Carroll (CHC) theory of intelligence that represented a combination of the theory of *Fluid and Crystallized intelligence* from Catell and Horn, and John Carroll's *Three-stratum theory* of cognitive abilities. In this theory more components were added: A fluid component of intelligence (Gf), a crystallized component of intelligence (Gc), a general memory and learning component (Gy), a broad visual perception component (Gv), a broad auditory perception component (Gu), a broad retrieval ability component (Gr), a broad cognitive speediness component (Gs), and a processing speed component (Gt) (Schneider & McGrew 2022). In 1997, O'Donnell described a new concept of *Spiritual Intelligence* with a holistic approach. The abilities related to this new definition included the ability to be efficient in getting results with the least possible time, money, and energy, to respect others, to be honest, to have dignity and serenity at work, to possess common sense when making decisions, to respond in a balanced way in difficult situations, and to focus on the positive aspects of others rather than criticize them (Sharifnia et al. 2022).

Emmons (2000) and Wigglesworth (2007) related *Spiritual Intelligence* (SI) to several slightly different abilities. Emmons connected SI to several abilities that allow individuals to transcend the physical and material: the ability to experience higher states of consciousness, the ability to see the spiritual in everyday life, the ability to use spiritual resources to solve problems, and the ability to be virtuous. (Rai, 2023). For Wigglesworth, SI was connected to the ability to connect to a higher Self, to be aware of the individual's ego, to be aware of a universal consciousness, to master self and ego, to possess a spiritual presence, and to master the social realm (Ma & Wang 2022). Using neuroscientific technology, some recent scientific studies have related intelligence to several neural connections between the frontal and parietal parts of the brain which allow

communication and exchange of information. This is the case of the *Frontal Integration Theory of Intelligence* from Jung and Haier (Jung & Haier 2007).

Theoretical Gap Analysis

In the realm of intelligence theories, one area that remains underexplored is the relationship between individual abilities to be conscious of their own feelings and limiting beliefs. While traditional models of intelligence—such as Spearman’s g factor, Howard Gardner’s theory of multiple intelligences, and Robert Sternberg’s triarchic theory—have significantly advanced our understanding of cognitive abilities, there is a notable theoretical gap when it comes to the interplay between emotional awareness, self-reflection, and belief systems. Theories on intelligence typically emphasize cognitive, analytical, or creative abilities, yet they often overlook the crucial aspects of emotional intelligence (EQ) and the role of limiting beliefs in shaping personal and professional outcomes.

One of the most prominent gaps lies in the relationship between cognitive intelligence (IQ) and emotional intelligence (EQ). While some models of intelligence, such as Daniel Goleman’s emotional intelligence framework, highlight the importance of being aware of and managing one’s emotions, this focus tends to center more on social interaction and less on the individual’s internal awareness of their own feelings and beliefs. The development of emotional awareness, particularly in terms of recognizing and challenging limiting beliefs, is not adequately integrated into mainstream intelligence models. This is critical oversight, given that individuals’ emotions and beliefs can significantly influence their cognitive processes, decision-making, and overall ability to function effectively in both personal and professional environments.

Limiting beliefs—those ingrained assumptions that prevent individuals from realizing their potential—play a key role in how people approach problems, interact with others, and manage stress. Yet, there is little in traditional intelligence theories that specifically address how these beliefs develop, how they limit cognitive flexibility, or how they might be overcome. For instance, cognitive-behavioral therapy (CBT) research has long shown that self-limiting beliefs affect one’s emotional state and ability to solve problems. However, intelligence theories typically focus more on processing information or solving problems in isolation, rather than how the individual’s internal dialogue and belief systems can impact their problem-solving capacities.

The integration of emotional awareness and limiting beliefs into a cohesive model of intelligence could enrich our understanding of individual differences in cognitive performance. Individuals who are highly conscious of their own emotions and aware of how limiting beliefs shape their thoughts and behaviors may possess a unique form of intelligence that is not captured by traditional IQ tests. This “meta-intelligence” would involve the ability to reflect on one’s emotional responses, identify underlying beliefs that may be constraining personal growth, and actively work to shift those beliefs toward more empowering perspectives. Additionally, this theoretical gap can also be viewed in terms of cultural and social factors. Many

intelligence theories fail to account for the ways in which cultural beliefs and social context shape an individual's emotional awareness and belief systems. For example, in collectivist cultures, the ability to tune into one's own emotions and beliefs might differ from individualist cultures, where personal autonomy and self-awareness are more highly valued. A comprehensive intelligence theory should therefore consider the broader social and cultural factors that influence emotional consciousness and the development of beliefs.

One potential direction for bridging this gap could be to expand emotional intelligence frameworks to incorporate the awareness and transformation of limiting beliefs as a key component of personal growth and cognitive development. This would align more closely with the growing body of research in areas like neuroplasticity, where individuals are shown to have the capacity to change their thought patterns, emotional responses, and beliefs through intentional practices such as mindfulness, cognitive reframing, and therapeutic interventions. In conclusion, the theoretical gap in intelligence theories related to an individual's ability to be conscious of their own feelings and limiting beliefs represents a significant opportunity for further research and integration. By incorporating emotional awareness and the transformative power of self-reflection into the broader concept of intelligence, we could develop more holistic models that account for the complex, dynamic nature of human cognition and personal development.

Problem Statement: Inner Knowledge and the Challenges of Knowledge Management (KM)

In 2000, Cope suggested that on top of *Organization knowledge*, workers, in corporations, could potentially expand their own *Personal Knowledge*, that is, the knowledge that they possess and use within the organization, by developing different cognitive processes, using their intuition, and acting. (Young 2012). In 2009, Jones proposed that *Personal Knowledge Management* (PKM) could be an area of *Knowledge Management* that encourages workers to be responsible for developing their own knowledge to increase productivity.

Although the concept of *Inner Knowledge creation* was first mentioned in 2012 by Young with the concept of “*Personal Knowledge Capital*” within the field of Knowledge Management, in 2022 Flor *et al.* suggested that *Inner Knowledge* (IK) was different to *Personal Knowledge* (PK) in the sense that IK allows workers to manage subjective and unconscious components -that PK does not contain- that affect the productivity, motivation, and wellbeing of workers.

In 2023 *Inner Knowledge Management* (IKM) was proposed as a model to observe, analyze, record, manage, and enhance *Inner Knowledge* (De la Flor *et al.*, 2023). The model proved that by helping individuals create, manage, store, and modify their Inner Knowledge, workers could increase their productivity, motivation, and well-being. The model suggested that in the first phase – the Introspective Evaluation phase – workers could observe, pinpoint, and classify inner assets (emotions and beliefs) by their internal or external approach. In the *Externalization* phase, workers were able to be aware of unconscious inner assets

(emotions and beliefs) that were limiting their potential. In the third phase – the *Start-up* phase – workers were able to manage those limiting inner assets (such as limiting beliefs and negative emotions), eliminating them and acquiring new objective data that would contribute to creating balanced emotions and positive habits. In the last phase – called the *Internalisation* phase – most workers were able to internalize new positive inner assets that were favorable to their productivity, motivation, and well-being.

The challenges of current KM models are that they do not deal with subjective components contained within knowledge and therefore they do not eliminate the interferences that these components bring to decision-making processes. On the contrary, the IKM model transforms conscious and unconscious subjective components into objective components preventing workers from seeing subjectively. Therefore, studying which IKM capabilities can manage negative emotions, limiting beliefs, and ideas about oneself, others, or the environment, transforming patterns, decisions, and actions, and understanding which types of intelligence can contribute to this aim, can help workers and organizations to use human and physical resources more efficiently.

Although the challenges of IKM are the quantitative measurement of subjective components, the absolute level of knowledge can be measured across all sub-skills within the discipline. The complete knowledge level of the assessment can fall within the weak, proficient or strong category. Percentile tests could be used to analyze workers from their scores to the absolute scores of the other test-taking population considering a relative standing. Each sub-skill could be assessed independently so that one sub-skill does not impact on the results of another. Using powerful algorithms and multiple correct response methodologies, different levels of knowledge regarding conscious and unconscious material can be assessed within each sub-skill. This score identifies an individual who can put their knowledge into practice. A low score indicates little ability to apply the knowledge. Subject coverage tests could provide the overall number that indicates the extent to which the test-taker has the ability ‘covered’. It is calculated by adding up the sub-skills that the candidate is Proficient or Strong as a percentage of the overall sub-skills. The higher the number, the more well-rounded the individual is.

Findings

To understand if the abilities described in the IKM model are related to one or more intelligence theories, the different intelligence theories, abilities, factors measured, and components need to be organized according to the various types of intelligence, number of factors measured, and nature of factors. Results can be seen in Table 1.

Table 1. Analysis of the most Important Intelligence Theories by Author(s), measured Factors, and their Nature

Year	Author/s	Theory	Type of Intelligence	Nº Measured Factors	Nature of factors
1904	Charles Spearman	General Intelligence theory	Cognitive Intelligence (Int.)	4	Mental (4)
1919	Jean Piaget	Cognitive Development theory	Cognitive Int.	3	Mental (3)
1920	Edward L. Thorndike	Social Intelligence theory	Social Int.	2	Emotional (2) Mental (1) Conscious (1)
1950 1964 1966	Maslow Beldoch Leuner	Emotional Intelligence theories	Emotional Int.	5	Mental (3) Emotional (3) Conscious (1)
1963	Raymond Cattell & Horn	Fluid and Crystallized factors of intelligence theory	Cognitive Int.	4	Mental (4)
1966	Das, Kirby, and Jarman	PASS theory of Intelligence	Cognitive Int.	4	Mental (4)
1983 1995 1999	Gardner	Multiple intelligences theory	Logical & Mathematical Int. Spatial Int. Linguistic Int. Intrapersonal- Interpersonal Int. Musical Int. Kinaesthetic Int. Naturalistic Int. Existential Int.	8	Mental (4) Emotional (2) Natural (2) Spiritual (1) Conscious (1)
1984	Stenberg	Triarchic theory of intelligence	Cognitive Int.	3	Mental (3) Mental Mental
1990	Zohar	Spiritual intelligence theory	Spiritual Int.	11	Conscious (2) Natural (1) Mental (4) Spiritual (2) Emotional (3)
1993	John Carroll Carroll, Cattell, and Horn	Three-stratum Theory of Intelligence Cattell-Horn-Carroll theory of intelligence (HCH)	Cognitive Int.	7	Mental (7)
1997	O'Donnell	Spiritual intelligence theory	Spiritual Int.	8	Mental (5) Emotional (4)
2000	Emmons Wigglesworth	Spiritual intelligence theory	Spiritual Int.	10	Conscious (4) Spiritual (5) Mental (1) Emotional (1)
				TOTAL: 69	TOTAL: 78

Following on from this, IKM abilities were classified and compared to the various abilities described by the different intelligence theories. As some IKM abilities are composed of several more specific abilities, two groups were created: a first group of abilities called the *broad inner abilities* and a second group formed by more specific abilities, called the *narrow inner abilities*.

The *broad inner abilities* would include: the ability to be objective, the ability to have a global vision, the ability to communicate positively and be an active listener, the ability to be empathetic to others, and the ability to feel serene. When comparing the six broader IKM abilities, results show that they all relate to at least one intelligence theory. The ability **to be objective** is related to all the factors measured by the *Cognitive Development theory* as IKM enhances the abilities to acquire, construct, and use (inner) knowledge. It is also related to understanding others' feelings (outer knowledge) – a factor measured in *Social Intelligence* – to recognizing and labelling one's own and other's feelings and emotions (inner), discerning and managing emotions (inner), and using them to conduct thinking and behaviour, typical of *Emotional intelligence*. It is also related to data comprehension (inner and outer knowledge) and learning abilities (learning how to distinguish inner from outer knowledge), which is typical of *Fluid and Crystallized intelligence theories*. In addition to this, it is connected to possessing attention abilities, simultaneous cognitive abilities, and successive cognitive abilities (to learn how to distinguish inner from outer) – typical of *PASS theory of Intelligence* – and to use analytical abilities to perceive problems (from being simultaneously aware of subjective and objective data). It is also linked to several practical abilities such as to acquire (objective) knowledge (pinpointed in the *Triarchic theory of intelligence*). Lastly it is related to possessing a self-awareness ability (to distinguish inner from outer) and the ability to ask fundamental "why?" questions – pinpointed in the *Spiritual intelligence theories* (Zohar) – and to the ability to be aware of the individual's own ego (Wigglesworth).

The ability **to have a global vision** is related to the following factors described in various intelligence theories: to possessing mathematical and spatial visualization and memory from the *General Intelligence theories* (Spearman), to be able to acquire, construct, and use (inner) knowledge from the *Cognitive Development theories* (Piaget), to be able to understand others' feelings (*Social intelligence*), to recognize and label one's own and other's feelings and emotions (*Emotional intelligence*), to possessing data comprehension skills, learning abilities (*Triarchic theory of intelligence*), attention abilities, simultaneous cognitive abilities and successive cognitive abilities (*PASS theory of intelligence*), emotional skills, skills to connect to and respect nature (*Naturalistic intelligence*), skills to resolve existential human issues (*Existential intelligence*), analytical abilities to perceive problems, practical abilities to acquire knowledge (*Triarchic theory of intelligence*), to have self-awareness ability, compassion, humility, the ability to ask fundamental "why?" questions (*Zohar's Spiritual Intelligence theory*);, in addition to several broad and narrow abilities including fluid intelligence (Gf), crystallized intelligence (Gc), general memory and learning (Gy), broad visual perception (Gv), broad auditory perception (Gu), broad retrieval abilities (Gr), broad cognitive speediness (Gs), processing speed (Gt) (from the *Cattell-Horn-Carroll theory of intelligence*), to be honest (from *O'Donnell's Spiritual intelligence theory*), to see the

spiritual in life (*Emmons' Spiritual theory*), to connect to a higher Self, to be aware of the individual's ego and to be aware of a universal consciousness (*Wigglesworth's Spiritual theory*).

The ability to **communicate positively and be an active listener** is linked to the following factors: to acquire, construct and use (inner and outer) knowledge (*Cognitive Development theories*), to understand others' feelings (*Social intelligence*), to recognize and label one's own and other's feelings and emotions, to discern and to manage emotions and use them to conduct thinking and behavior (*Emotional intelligence*), to verbal and writing skills (*Linguistic intelligence*), to analytical abilities to perceive problems (inner and outer knowledge), to the creative abilities necessary to solve problems and practical abilities to acquire knowledge (inner and outer), to the ability to be spontaneous, to the ability to be vision- and value-led, to the ability to think holistically and to be compassionate, the ability to celebrate diversity and having a feeling of independence, the ability to be humble and to ask fundamental "why?" questions, the ability to reframe, to the positive use of adversity and to having a sense of vocation (typical from *Zohar's Spiritual intelligence theory*), to possess the general cognitive abilities, the broad and narrow abilities (from the *Cattell-Horn-Carroll theory of intelligence*), to the ability to be efficient getting results with the least possible time, money, and energy, to the ability to respect others & to be honest, to the ability to have dignity and serenity at work, to the ability to have common sense in the making of decisions and to respond in a serene way in difficult situations, to the ability to focus on the positive aspects of others rather than criticize them (typical of *O'Donnell's Spiritual theory of intelligence*), and to the ability to be virtuous, to be aware of the individual's ego, to master the self and the ego and to master the social realm (typical of *Emmons and Wigglesworth Spiritual theory of intelligence* relatively).

The ability to **be empathetic to others** is linked to the following factors: to acquire, construct and use (inner and outer) knowledge (*Cognitive Development theory*), to understand others' feelings (*Social intelligence*), to recognize and label other's feelings and emotions and to use them to conduct thinking and behavior (*Emotional intelligence*), to possess analytical abilities, to perceive problems (inner and outer), to possess practical abilities to acquire knowledge (inner and outer), to be compassionate, to celebrate diversity, to ask fundamental "why?" questions, to the ability to reframe and to the positive use of adversity and having a sense of vocation (typical of *Zohar's Spiritual intelligence theory*), to possessing general cognitive abilities, broad and narrow abilities (from the *Cattell-Horn-Carroll theory of intelligence*), the ability to respect others and to be honest, the ability to respond in a serene way to difficult situations, the ability to focus on the positive aspects of others rather than criticize them (*O'Donnell's Spiritual theory of intelligence*) and the ability of being aware of the individual's ego (*Emmons Spiritual theory of intelligence*).

The ability to **feel serene** is also linked to several abilities: the ability to respect others and to be honest, the ability to have dignity and serenity at work, the ability to possess common sense in decision-making and to respond serenely to difficult situations, (*O'Donnell's Spiritual theory of intelligence*), the ability to be aware of the individual's ego, the ability to be aware of universal consciousness, the ability to master self and ego and the ability to manifest a spiritual presence

(Wigglesworth *Spiritual theory of intelligence*). The ability to **feel self-assured** is linked to a self-awareness ability (Zohar's *Spiritual intelligence theory*).

The *narrow inner abilities* related to the different IKM phases were compared to the factors pinpointed in the various intelligence theories, some of them not yet described by any intelligence theory. Results can be seen in Table 2.

Table 2. *Analysis of IKM Narrow Abilities related to different Types of Intelligence*

IKM Phase		Action required	Narrow abilities needed	Theory that is linked to
Introspective Evaluation	1	To be aware of own needs and level of satisfaction	Self-awareness ability	Spiritual intelligence (Zohar)
	2	To create SMART goals and strategies	Planning cognitive abilities, attention abilities, simultaneous cognitive abilities, and successive cognitive abilities	PASS theory of intelligence
	3		Analytical abilities to perceive problems, creative abilities to solve problems and practical abilities to acquire knowledge	Triarchy theory of intelligence
	4		Broad and narrow abilities	HCH theory of intelligence
	5		Ability to be efficient, getting results with the least possible time, money, and energy and the ability to possess common sense decision making	Spiritual intelligence (O'Donnell)
	6	To observe conscious inner assets (IA)	Recognize own and other's feelings and emotions	Social theory of intelligence
	7		Recognize own conscious limiting beliefs	Spiritual intelligence (Wigglesworth)
	8	To pinpoint conscious IA	Discern between conscious emotions	Emotional theory of intelligence
	9		Discern between conscious limiting beliefs	NOT FOUND
	10	To classify conscious IA	Classify own conscious emotions between balanced and unbalanced	Social intelligence
	11		Classify own conscious beliefs as limiting or powerful	NOT FOUND
Externalization phase	1	Observe, pinpoint, and classify unconscious limiting IA	Observe, pinpoint, and classify own unconscious emotions	Emotional intelligence
	2		Observe, pinpoint, and classify own unconscious beliefs as limiting or powerful	NOT FOUND
Start Up phase	1	Manage Unconscious IA	Manage conscious and unconscious unbalanced emotions	Emotional intelligence
	2		Manage conscious and unconscious limiting beliefs (manage ego)	Spiritual intelligence (Wigglesworth)
	3	To transform inefficient IA into efficient IA	Acquire or construct new efficient inner knowledge	Cognitive-development theory
	4		Experience balanced emotions	Emotional intelligence theory
	5		Ability to not judge self and others, to accept own limitations, circumstances, and other people and to disidentify from their own inner assets	NOT FOUND
Internalization phase	1	To internalize new powerful data	Ability to recognize self-worth and self-power and not to feel above or below others in value, worth or power	NOT FOUND

	2	To experience balanced emotions, to communicate and behave in an efficient way	Ability to experience vitality, wellbeing, curiosity, compassion for self and for others, serenity, confidence in self and in the environment	Emotional intelligence theory
	3	To feel inner peace and develop intuition	Ability to feel inner peace and develop intuition	NOT FOUND

The results of analyzing the intelligence theories designed over the last two centuries, the several factors or abilities described in them as well as the method in which knowledge is acquired or managed, include the following conclusions:

1. All factors described in the intelligence theories possess one or more components of different nature: natural, mental, emotional, conscious, and spiritual.
2. The 12 intelligence theories describe 69 factors composed of 79 components. From the point of view of their natures, the factors that have been studied the most are factors that possess a mental component (as 55% of all components are mental), followed by factors that possess an emotional component (18%), then factors that possess a conscious component (11%), then factors that possess a spiritual component (10%), and lastly, factors that possess a natural component (3%), as seen in Table 3.

Table 3. *Percentage of Factors analyzed by Intelligence Theories according to their Nature*

Nature of factors described in Intelligence theories	Example of factors that share this component	Number of components in the various factors described	%
Mental	Analytical skills, mathematical skills, verbal skills spatial visualization and memory	44	55%
Emotional	Ability to feel own emotions and communicate them	15	18%
Conscious	Ability to be conscious of own emotions	9	11%
Spiritual	Ability to see the spiritual in life, the ability to be aware of a universal consciousness, ability to possess a spiritual presence	8	10%
Natural	The ability to gather information, be spontaneous, or possess musical skills	3	3%
TOTAL		79	

3. Some factors are related to a single component and some of them are related to two or more components. The more components the ability or the factor possesses, the more layers of complexity it entails. For example,

to resolve a mathematical exercise entails 2 components, one natural (the ability to have access to data through the senses) and one mental component (the capacity that allows the individual to do math). The ability to stop working due to a shocking piece of news such as being informed of a car accident of a family member, entails 3 components, one natural (the ability to have access to data through the senses), one mental component (to process mentally the information, etc.), and one emotional component (to be able to feel own emotions). The ability to communicate effectively and give support to a child who is crying because their dog is lost, entails 4 components, one natural (the ability to have access to data through the senses), one mental component (to analyze the situation, gather information, talk, etc.), one emotional component (to be able to feel own emotions), and one conscious component (to be able to be conscious of the child's emotions). The ability to use spiritual resources to help a drug addict to effectively stay away from the drugs has 5 components: one natural (the ability to have access to data through the senses), one mental (to analyze the situation, gather information, talk etc.), one emotional (to be able to feel own emotions), one conscious component (to be able to be conscious of the person's emotions), and one spiritual (to have access to and use spiritual resources).

4. Factors with natural components are simpler to measure than factors with mental, emotional, conscious or spiritual components, probably because natural factors imply simpler actions and can be measured in a more simplistic way than, for example, mental components and so on. In turn, mental components seem simpler to observe and measure than emotional, conscious or spiritual components.
5. With regards to the six broad IKM abilities described in Table 1 (the ability to be objective, the ability to have a global vision, the ability to be empathetic to others, the ability to communicate positively and be an active listener, the ability to feel serene and to feel self-assured when making decisions), they all have a correspondent ability with at least one intelligence theory. Nevertheless, when analyzing the 20 narrow IKM abilities necessary to achieve the different actions required in each IKM phase, it was observed that only 14 out of the 20 abilities described correspond with an ability described in an intelligence theory.

The IKM abilities that are not related to any intelligence theory are:

- a) the ability to observe, pinpoint and classify conscious beliefs from the *Introspective* phase
- b) the ability to observe, pinpoint and classify unconscious beliefs from the *Externalization* phase
- c) the ability to manage conscious and unconscious beliefs from the *Start-up* phase
- d) the ability to create or acquire objective information through the ability not to judge oneself or others, to accept oneself, others & circumstances, the ability to disidentify from ego, the ability to feel self-value, self-worth and

the using of one's own power (without feeling above or below others in value, merit, or power), the ability to feel balanced emotions including inner peace plus the ability to develop intuition in order to create efficient behavior from the *Internalization* phase

This means that there are six abilities that have never been included in any of the intelligence theoretical models. These are:

- 1) The ability to discern between conscious limiting beliefs and objective data and to classify them as neutral or limiting.
 - 2) The ability to discern between unconscious limiting beliefs and objective data and to classify them as neutral or limiting.
 - 3) The ability to manage conscious and unconscious beliefs, substituting them by objective data; 4, the ability not to judge oneself and others, to accept one's own limitations, circumstances, and people and to disidentify from their own inner assets (beliefs and emotions).
 - 4) The ability to feel self-value, self-worth and the ability to use one's own power (without feeling above or below others in value, merit or power); and
 - 5) The ability to find inner peace and develop intuition to create efficient behavior.
6. From the study it was also observed that there are several factors that possess a conscious component that have been included in other intelligence theories. These are: the ability to be aware of one's own and others' emotions (*Emotional intelligence*), the ability to be aware of a higher self (*Spiritual intelligence*), the ability of be aware of nature needs (*Naturalistic intelligence*), the ability to be compassionate towards others, the ability to have a sense of vocation (both from *Zohar's Spiritual intelligence*), and the ability to be aware of a universal consciousness (*Wigglesworth's Spiritual intelligence*).

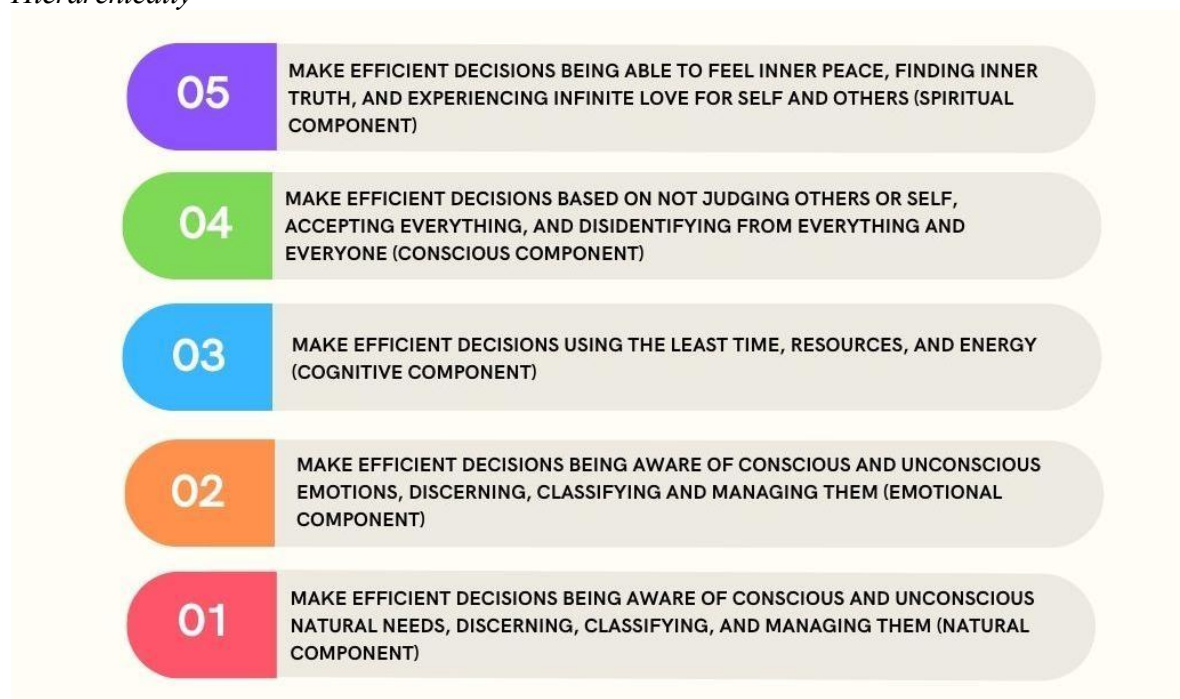
Discussion and Conclusions

Intelligence theories have been used as an attempt to understand which human abilities and capacities bring humankind closer to knowledge and to study to what extent knowledge can be reached, understood, and managed with our limited physical resources. Science has investigated different abilities with natural, emotional, mental, conscious, and spiritual components and several theories to cluster these abilities under different types of intelligence have been designed. Perceiving, managing, transmitting, memorizing, learning, relating, or processing data were some of the most basic abilities that scientists started measuring to understand the limits and capacities of the human mind. After two centuries, science has suggested that intelligence is something wider than just a sum of cognitive abilities. The ability to be aware of one's own and others' feelings has allowed scientists to understand that the power to connect and be compassionate toward others and towards themselves can be developed. The ability to connect with nature has allowed scientists to understand that the power to connect and

protect nature can be developed. The ability to be conscious of unconscious negative emotions and limiting beliefs described in the IKM has allowed scientists to understand that the power to overcome inner limits can be developed and the ability to connect with something larger than anything from this world can be developed.

Furthermore, this study allows understanding that when placing IKM abilities with the abilities described in the most important theories of intelligence over the last two centuries, it can be observed that six specific abilities with conscious components have not yet been described in any intelligence theory so far. Considering that some intelligence theories have described several abilities with conscious components, the study proposes that if all the abilities that possess a conscious component are grouped together, including those described in the IKM model and a few others described before in various intelligence theories, then a new type of intelligence can be defined. Organizing all these factors hierarchically according to the components of different nature (natural, emotional, mental, conscious and spiritual) that are contained within, would create an image of what this new type of intelligence would look like covering all the different aspects explored in the various intelligence theories so far. This includes the most basic natural components up to the spiritual components. All factors related to this new type of intelligence can be accommodated hierarchically in 5 different layers as described in Image 1.

Image 1. *Conscious Intelligence Factors organized by Layers Hierarchically*



Finally, this study proposes that the ability to use spiritual resources to solve problems is dependent on the realization of several other factors. Firstly, one needs to exist (existence has an inherent natural component related to natural intelligence), then one needs to be able to be a sentient being (a being that can feel emotions), then one needs to be able solve problems (a being that has some basic

mental capacities), then one needs to be able to be aware of things (a being that can use consciousness internally and externally) and lastly one needs to be able to connect with the spiritual realm (a being that can have a spiritual experience). This way, factors or abilities can also be classified in a hierarchical structure as described in Image 2.

On top of its conclusions, the study proposes to use an Intelligence Pyramid, following what Rowley proposed in 2007 for knowledge as described in Image 2 which explains the hierarchical relationships between cognitive, emotional, conscious, and spiritual factors described in the various intelligence theories. As the DIKW Pyramid (Rowley, 2007) explained, there could be a hierarchy or functional relationship between data, information, knowledge, and wisdom with information being defined in terms of data, knowledge being defined in terms of information, and wisdom being defined in terms of knowledge. The Intelligence Pyramid proposes that there could be a functional relationship between cognitive, emotional, conscious, and spiritual intelligence.

This would imply that cognitive intelligence centered on knowledge of objective data would be the most basic intelligence followed by emotional intelligence which focuses on knowledge of emotional data, and this in turn would be followed by conscious intelligence which focuses on being aware of conscious and unconscious data, and lastly, this would be followed by the spiritual intelligence which focuses on the spiritual experience.

Image 2. *The Intelligence Pyramid*

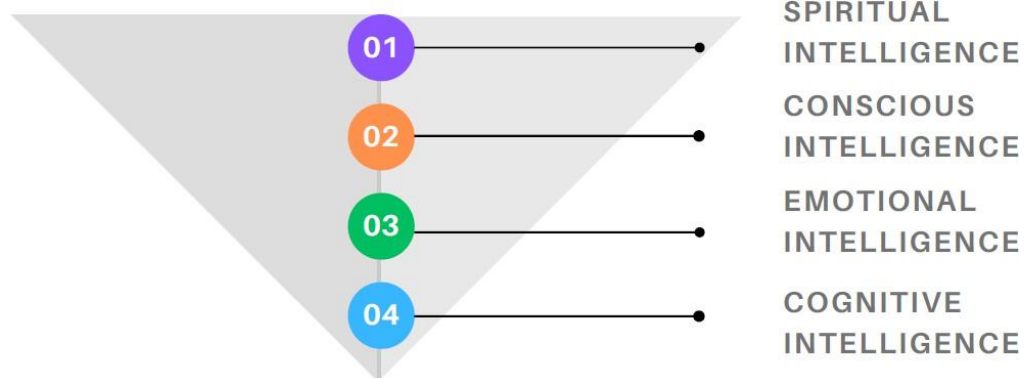


Image 2. *Factors of Intelligence Theories classified by their Nature and Hierarchical Structure*



Contributions of the Article

The Importance of Inner knowledge in the Digital Age

In the digital age, managing beliefs and difficult emotions has become more important than ever. The rapid evolution of technology and the pervasive influence of the internet have created a world where information is accessible at an unprecedented scale, and where emotional responses can be triggered instantly through social media, online forums, or news outlets. The constant bombardment of information, opinions, and world events can lead to mental exhaustion, confusion, and emotional instability if not properly managed. In this context, the ability to regulate beliefs and emotions becomes critical for personal well-being, as well as for fostering healthy interactions in society.

One of the most significant challenges in the digital age is the overwhelming amount of information people encounter daily. With just a few clicks, individuals can access a variety of perspectives on almost any topic, from political debates to health advice. While this wealth of information has its advantages, it also creates the risk of information overload. In this environment, it is easy for people to become attached to certain beliefs, often based on the most emotionally charged or sensationalized content they encounter online. This phenomenon is amplified by

algorithms that prioritize content likely to evoke strong emotions—such as anger, fear, or outrage—instead of balanced, objective information.

For instance, social media platforms often fuel confirmation bias, where users are shown content that aligns with their pre-existing beliefs, reinforcing those beliefs and making it harder to consider alternative perspectives. This narrowing of worldview can contribute to the polarization of societies, where individuals or groups become increasingly entrenched in their views, dismissing others as uninformed or even dangerous. Using *Inner Knowledge* management, and therefore *Conscious intelligence* in such an environment would allow individuals to cultivate critical thinking skills and the awareness that the information they consume might be incomplete, misleading, or designed to trigger an emotional reaction.

Research Limitations

This study is limited to the IKM abilities and those that have been described in the various intelligence models over the last two centuries. Further research needs to be done to complete the list of factors that could form this potentially new type of intelligence. The study is also limited to the analysis of the connections between the IKM factors and certain types of intelligence, keeping in mind that their approaches are completely different. This is the case of the *Parieto-frontal integration theory of intelligence* because its approach is purely biological. The analysis does not consider other research models of cognitive processes beyond the different types of intelligence, such as the different models of human consciousness. The analysis does not study the lines of connection between knowledge and wisdom.

Future Lines of Research and Research Suggestions

As much as IQ tests establish that certain abilities such as perceiving, managing, transmitting, memorizing, learning, and processing data somehow differ between individuals, future lines of research could entail:

1. Exploring whether Conscious intelligence (CI) abilities are nurture or nature related.
2. Measure CI factors more in detail in order to comprehend their relationship with various levels of intelligence.
3. Measure the relationship between Conscious intelligence and Spiritual intelligence as well as Cognitive intelligence and Conscious intelligence. Compare all the IKM factors with the different intelligence theories as some of them do not correspond to any of them.
4. Explore how new organizations might be developing conscious intelligence as groups based on the research of Jones, P. (2024) on *Business company approaches to the protection of nature and biodiversity* where the conservation and protection of nature is attracting increasing attention in the business world.

5. Explore how Conscious intelligence can help with the challenges in this new deglobalization (Papanikos, 2024) as mentioned in the article The Future of Globalization.
6. Explore whether Conscious intelligence can help develop ethics and integrity in business or like Gregory Papanikos, (Papanikos, 2025) indicated ethics and integrity can be taught.
7. Explore whether Conscious intelligence can help governments to respect human rights as indicated in the research done by G.T. Papanikos (Papanikos, 2025).

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Understanding Inflation through Investigating US Economic Data over Fifty Years: Introducing the Losses Model

By Hemmat Safwat*

Since 1988, the author has investigated the analogy between Macroeconomics and Macrohemodynamics. He progressively established a close relation between Knowledge and Energy leading to deal with knowledge in terms of the commonly used unit for energy Joule or kWh. After these endeavors the author decided to tackle inflation. He chose to investigate the US economic data between 1971 to 2024. For Inflation CPI, the influences of the Personal Consumption Expenditure PCE, Interest Rate, and Unemployment Rate were examined for intervals involving the seven formally recognized recessions encountered between 1971 to 2024. The author identified intervals outside the recessions which are referred to as Eras. The durations of both the recessions and the Era's intervals come into play as well. Some explanations were reached but some observed behaviors proved too complex for the recessions. For the 7 recessions intervals, and the Era's which were subdivided into two, i.e. total of 21 intervals, for each interval key data were selected, these subsequently assigned to 54 years in preparation for a second step simulating "calculated CPI". The author stipulated that the calculated CPI leads to end-losses at the level of end consumers. These annual end-losses in monetary values were converted to equivalent electrical energy using a recently introduced KEI (Knowledge Energy Index). The author argues that the end-losses cannot be recovered completely, and their cumulative effect form an ever-increasing trend.

Keywords: Inflation, Consumer Personal Expenditure, Consumer Price Index, Recessions, Losses, Sustainability

Preamble

It may be useful to learn how the author got started and continued his research in economics. It all started in 1987, when he took a course in economics as part of his MBA classes. In that course, he observed that the indifference curves shown on Price - Quantity diagrams for different utility levels had the same shape of isothermal (constant temperature) or isentropic (constant entropy) lines in PV Pressure – Volume diagram in Macro thermodynamics. He discussed this observation with professor Dr. Ibrahim Oweiss (a recognized economics expert and Economics professor at George Town University) and the two commenced investigating the analogy between Macroeconomics and Macro-thermodynamics. That collaboration resulted in publishing Safwat HH, Oweiss IM (2002). The reaction to this book from the economics community was not encouraging. The author got busy with his job until he retired in late 2020. He embarked on his second concerted effort in economics investigations. He concentrated on business economics, and unfortunately, he did not have the

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support of his partner Dr. Oweiss. So since late 2020 he carried out his economics investigations on his own producing *Safwat HH (2022)* and *Safwat HH (2024)*. Recently, the author intensified search for previous published work in area of Macro-economics and Macro-thermodynamics combinations and found in Samuelson's Collected scientific Papers of *Samuelson PA (1983)*. Thus, the author got more emboldened and decided to venture in investigating a key topic in economics that is **inflation**. The question is **what can explain the continued rise in cost of living with time as we see it and continue to face**. The author hopes that this paper gives plausible explanations to this question.

Introduction

In search for answers to the underlined question, the author decided to examine what he learned from Macro-thermodynamics, as start, he thought of possibility of extending “the End-losses” that the second law of Thermodynamics contemplates for thermal cycles to Macro-economics. Simply, based on the second law of Thermodynamics in any thermodynamic cycle, that involves a sequence of processes that return to the same original state, will see rejected energy – “End-losses”. By analogy the first law of Thermodynamics addresses the balancing of mass and energy. Thus, in a complete thermal cycle the sum of energies leaving a system is equal to those entering minus any accumulation, (by virtue of returning to the original state). This would signify that the accounting principles that are used in Macro-economics which form the equalization of the sums of output and the input, i.e. is equivalent to the first law of Thermodynamics.

The author embarked on investigating this premise and this paper is the result of his endeavors. Before moving to present the content of this paper, the author wants to underline an important finding related topic that is the knowledge energy index *Safwat HH (2025)*. The relevance of this index is establishing a relationship of the human capital “knowledge” to electricity. The increasing trends of knowledge and electricity are well known to all concerned with the economic growth of a nation's economy. Against this background the author proceeded to tackle inflation in this paper, noting inflation is a primary topic in Macro-economics.

The paper is organized in three parts as follows, after the Introduction some relevant information that would help in explaining what led the author to use as bases to examine the premise that reject losses are behind inflation and some supporting info are noted. These convinced him of the merits to substantiate that premise. This information is found under Part I: **Relevant Information - From Electrical Systems, Work-Force Economic Cycle, and Human Capital and Energy**. Then, the paper's thrust shifts to the examination of pertinent US economic data between 1971 to 2024 in Part II. The aim here is to study inflation changes and key parameters that relate ultimately to the consumers consumption and the losses that can be encountered at end-consumers (households). Under Part II: **Study US Economic Data - Important Data, Review of US Data, and, Analysis of Select US Economic Data (1971-2024) with Focus on Inflation**. Accompanying the last section in part II, is the **Appendix** found at the end of the paper. In the Appendix details of the analysis methodology of

the select US economic data is described. Lastly, under Part III **Findings**, the following sections are found **Takeaway from the Appendix, Sustainability/Conservation/Waste**, and, **Concluding Remarks**.

Before moving to start Part I, the author would like to share three additional insights:

- The approach presented in this paper evolved after he explored several methodologies, some were based on published and others he devised. These had shortcomings. While these were useful, but they were not successful. Thus, they are not covered in the paper.
- The author elected to examine the economy of the USA over the last 50 years to understand what leads to the mysterious word “**inflation**”. Why the USA, because of the availability of excellent data as noted in the later parts of the paper. In the last 50 years, much better understanding of the complexities of the interactions of different parameters that affect inflation changes with time have been reached. To note the central role of the US’s Federal Reserve Board “FRB” and Central Banks of nations, in setting the Monetary Policies and monitoring/taking necessary actions to control inflation to grow the economy and combat unemployment in timely manner. These bodies are supported by entities that compile and analyze data.
- When the author started reviewing available US economic data sources, he quickly saw the influence of the economic (business) cycles and hence it was imperative to examine the economic cycles associated with the encountered recessions in the USA between 1971 - 2024.

Relevant Information

From Electrical Systems

In this section, the author draws attention to two aspects that are crucial in the operation of the electrical systems (the grids in various countries), these are i) Supply and Demand, ii) Losses. The reader can refer to Safwat HH (2024) for two comparative diagrams of an electricity system and a products & services markets to see the similarities leading to analogous characteristics.

Electrical System and Demand – Supply

The electrical system (ES) has power generation subsystem consisting of power plants, and the other two subsystems transmission and distribution, through the latter end-consumers are connected. At a given instance, the various consumers (industrial, commercial and residential) get the electricity they need. The demand is the summation of what the consumers require at this time. On the side of the power generation that is the supply side, through the dispatch system of the power grid, the various power plants in the generation subsystem are operated depending on plants readiness, and capacities and efficiencies at the appropriate load (as close as possible to full load of the plant) in accordance with merit priorities established by the dispatch center. This is the process to cope with the demand from the supply assets. One can

refer to this aspect as coping with the mismatch of the aggregates of the supply and the total demand at a given instant. The controls from the dispatch center of the electrical grid and the generation plant use signals from the voltage and the synchronous speed of the network to adjust the controls of the generating plants including possible shutdown and start-up of generation units connected to the grid. Noting, that the dispatch center required the power plants to maintain a running reserve to respond to any sudden/unexpected increase in the demand. Historical data help the dispatch center to forecast possible future scenarios.

In this paper, we are concerned with Macroeconomics, thus we are dealing with the aggregate of the goods and services for a nation. In the big picture, this aggregates of the supply and demand, adjust based on the actions of the central bank, in the US these actions are by the FRB that beside setting the monetary policy. The FRB adjusts mainly the interest rate, and the money supply.

To note, that in recent years, with increased renewable energy in the generation mix in an ES to cope with the intermittent wind or solar energy, electricity storage e.g. in battery's took an increasing role in the ES, this is analogous to warehousing compared to use of just-in-time production in products markets.

Comparing a nation's economy to ES operation, in the ES, we deal with one commodity that is electricity and the demand – supply is monitored and controlled based on momentary/instantaneous changes in the grid. In the case of the nation's economy, the aggregate demand and supply are much more complicated because of the variety of the goods and services, and we are generally concerned with much longer time to monitor the changes, e.g. the Consumer Price Index "CPI" over a month or quarter.

Electrical System – Energy-Losses

As noted earlier a typical ES consists of three subsystems, generation, transmission and distribution. The generation is primarily the power plants, the transmission included high voltage transmission lines and substations, and the distribution includes medium voltage substations and cabling to the end consumers. In recent years this delineation has changed because of the spread/increase of renewable energy, solar and wind power plants that have been installed closer to the consumers thus now distribution subsystems include generation and in some instances for large renewable plants they connect to the transmission subsystems. This change has altered the previously known unidirectional flow of electricity from the generation subsystem to the transmission then to distribution subsystems.

There are inherent energy losses in the transmission and the distribution subsystems (losses at substations and cables) as well as in the power plants in the generation subsystem. These are referred to technical losses. In some cases, there are an illegal (thefts) of electricity. The principals of the subsystems (the operators) attempt to minimize these losses in the design of the assets and through operation and maintenance activities as well a security measures. In the power plants, the highest efficiency is targeted but typically the plant design has one best efficiency set point and the operation dictates different points of operation depending on the demand, the off-best efficiency operation leads to higher losses. In the transmission and distribution subsystems, depending on the economics the sizing of the cables and substations is also

commensurate to best operation rating. However, the assets operate at different modes and hence there are larger losses. The principals of the generation, transmission and distribution try to minimize the losses to lower their tariffs. When we get to the end consumers, e.g. a household there are inefficiencies of old appliances that may be in use. In many cases the end customers are not pay attention to reducing their consumption particularly when the electricity prices are not high. This is why in different countries energy conservation is receiving considerable attention. From the perspective of the end customer, the household is paying indirectly for the losses at the ES subsystems. The thrust of ES subsystems operators is to minimize their costs to offer best tariffs. The losses at the end customers are difficult to estimate but on the aggregate level, the losses at the end users add up and have a negative effect. These losses end up as wasted energy to the surroundings. These losses cause unwanted effects to the environment, particularly if the electrical energy was generated from fossil plants. By analogy in the nation's economy, there are losses in the various steps, in the chains of the manufacturing, transport, and storage in the whole sellers and distributors etc. These losses are factored in the prices of the intermediate steps and hence they are indirectly born by the end customer. The sustainability programs in different countries target reducing the losses that are mentioned above whether in the ES or by analogy in the goods and services chains of production the incentives of the market as producers are competing on price. The losses at the end customer are more complex. Factors such as discipline, habits, proudness, income levels etc. come into play. The word waste stands out. From this point, onwards we shall use the term "End-Losses"

Work-Force Economic Cycle

It is interesting to see the workforce in an economy of a nation, individuals of the workforce are engaged in successive cycles, the cycle is composed of activities the workforce engages in their daily work that result into goods and services. And the cycle is completed when they and their households buy and consume goods and services. In an economy of nation, the first set of activities relate to the Gross Domestic Product (GDP), Gross National Product (GNP) and Gross National Income (GNI). While the latter is associated with the consumption Consumer Personal Expenditure (CPE). The author chose to use the word cycle as the we have a repetitive set of activities in the production and consumption sides over periods days or weeks etc. Noting the well-known formula for the four parts of the GDP

$$\text{GDP} = \text{C} + \text{I} + \text{G} + \text{NX}$$

Where "C" is *Personal Consumption Expenditure* (goods and services people buy), "I" *Investment*– Business spending on fixed assets and unsold inventory as well as purchases of homes, **G** *Government Spending* Federal, State and Local governments spending in goods and services, **NX** *exports minus imports*.

This paper aims to investigate ultimately what happens with CPE and ultimately End-Losses in relation to inflation. The G and NX are not investigated.

Human Capital and Energy

Based on his review of price data for labor and electricity in the US and Europe the author recently proposed a Knowledge Energy Index (KEI), Safwat HH, (2025). This index reflects high values in the ratio of the average wage per hour to the electricity price per kWh. This suggests that the value of the labor which translates to application of knowledge is a lot higher than the value of electricity. Thus, knowledge has many folds higher value than electricity, and we know among energy forms electricity has the highest grade of energy (e.g. fuel energy) because of it offers versatile utility.

This conclusion is essential to the treatment of the value added by the working population in a nation as a high value (grade) energy.

Application of the Newly Introduced Knowledge-Energy Index

From Safwat HH, (2025), for the US, in 2024 the KEI is approximately 200. This means that what human capital constitutes is more precious than electricity. Thus, the addition of knowledge by the humans does not follow what we encounter in thermal cycles when we are dealing with conversion of thermal energy to electricity. The human capital is knowledge which has higher grade than electricity.

In view of the KEI the author concentrated on examining the waste (End Losses) at the end customers as the main reason for the inflation. The following supported this notion:

- a) Figure 1 (in Part II) represents the US Consumer Price Index “CPI” –this is the central parameter this paper is dealing with. We all know that due to inflation, we see the price of what we buy from goods and services is always increasing with time. Conversely stated, the same amount of money buys less goods/services. This is of paramount importance for the discussions of this paper.
- b) From Macro-thermodynamics, we know that in actual processes, irreversibility’s cause increase of entropy (defined (dQ/T) , where dQ is change in heat units’ energy and T is the absolute temperature. The author argues that in an enterprise, the tasks are combination of Knowledge & Energy application. Please refer to the Knowledge & Energy pair model Safwat HH, (2022). Without going into entropy changes and exergy (specialized topics in thermodynamics), it suffices to say that the rejection of very large heat (reject losses) from various power plants contribute to the increase of the temperature of the receiving body, what was perceived as an infinite body of waters in the earth, is not so when the heat rejected is very excessive.

Study US Economic Data

In this section, we cite important information from the US economic data that sets the stage for the presentation of what the author is offering through this paper. Five parameters are included: **US Consumer Price Index CPI**, **US M1 Money Stock**, **US**

Velocity of M1, US Federal Funds Effective Rate, and US Unemployment Rate. The first is central to the topic of the paper, the “CPI”. Changes of the four other parameters influence the CPI changes. Other factors come into play indirectly or directly in secondary effects, but their mention is deferred to later.

Figure 1. *US Consumer Price Index US Federal Reserve Bank St.Louis (n.d.)*

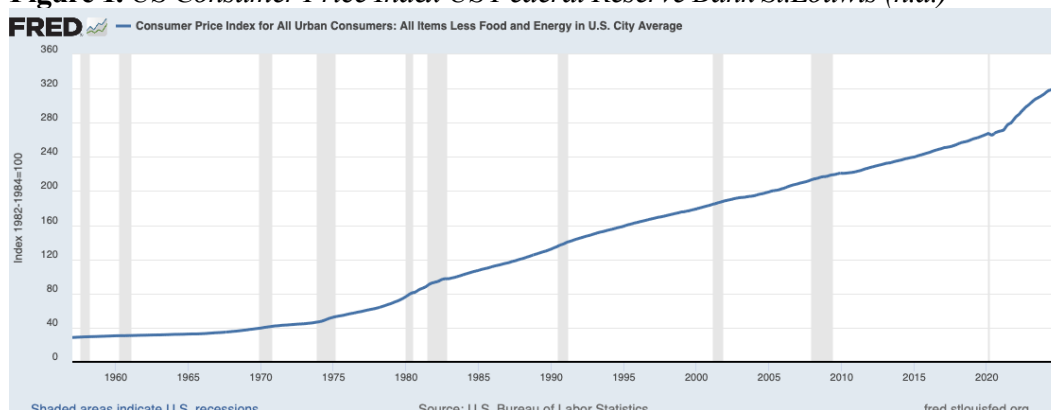
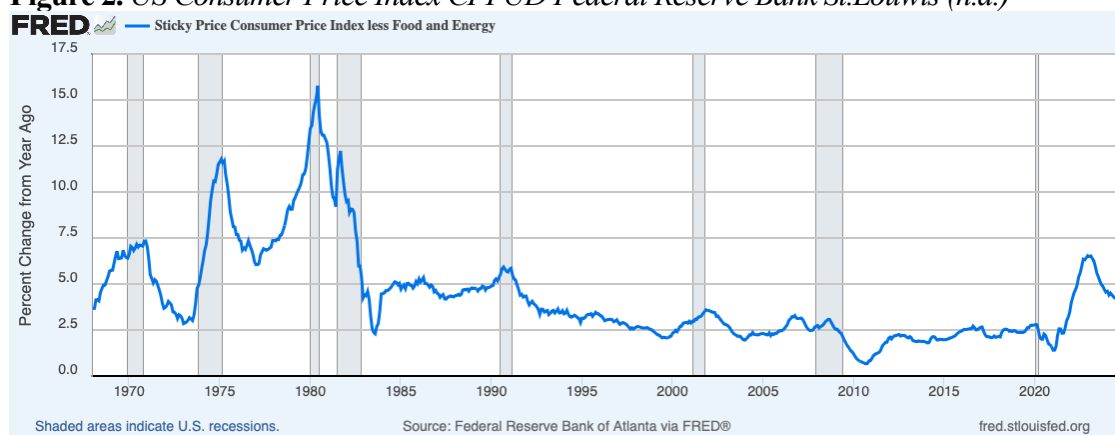


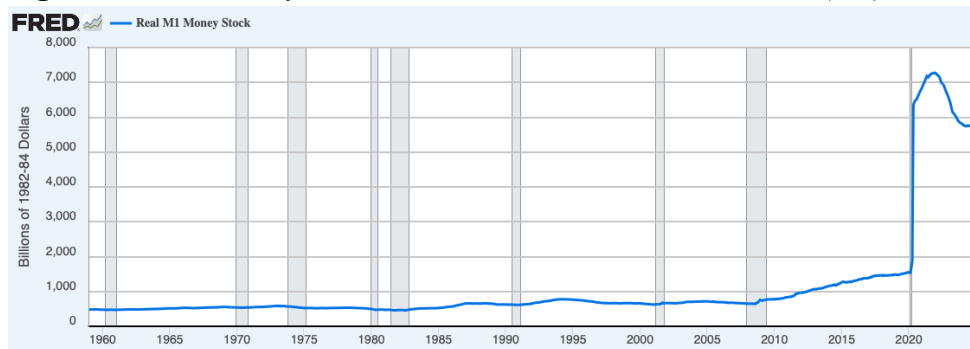
Figure 2. *US Consumer Price Index CPI UD Federal Reserve Bank St.Louis (n.d.)*



Please note the shaded (grey) areas in Figure 2 and the following Figures 3, 4, 5 and 6 depict the formal recessions as endorsed by *National Bureau Economic Research (n.d.)*

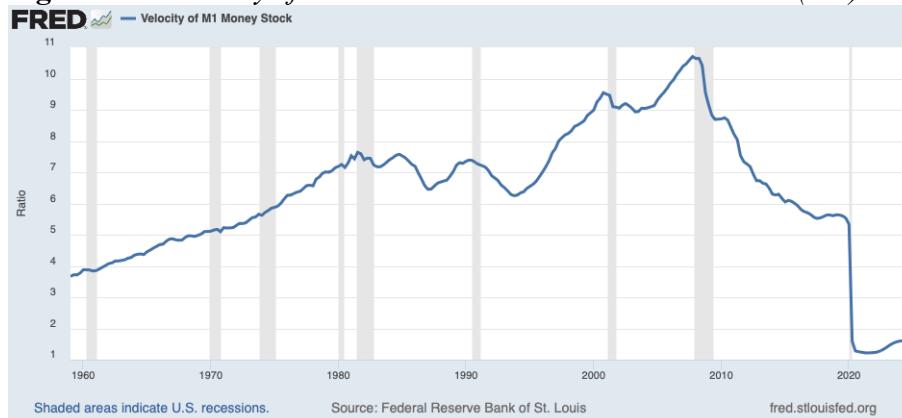
In Figures 2 – 6, the durations in the figures represent the formally accepted recessions durations *National Bureau Economic Research (n.d.)*. Of interest for this paper are the seven recessions encountered after 1970 appearing in these figures. Just a comment about recessions, generally they are shocks that are encountered due to major event – could be like in 1973 due to oil embargo as a result of a political action(s), or in the case of the COVID 19 an epidemic. Major Climate disasters may cause of a start of a recession. The government and the central bank try to cope with these shocks to dampen their effects on the well-being of the nation’s citizens.

Figure 3. *US M1 Money Stock UD Federal Reserve Bank St.Louis (n.d.)*



In Figure 3, the extra-ordinary injection of funds in 2020 is noted with the steady gradual rise in M1 from 2010 prior to 2020. M1 peaked around 2022 before starting to drop. The excessive high increase in 2020 is noted.

Figure 4. *US Velocity of M1 UD Federal Reserve Bank St.Louis (n.d.)*

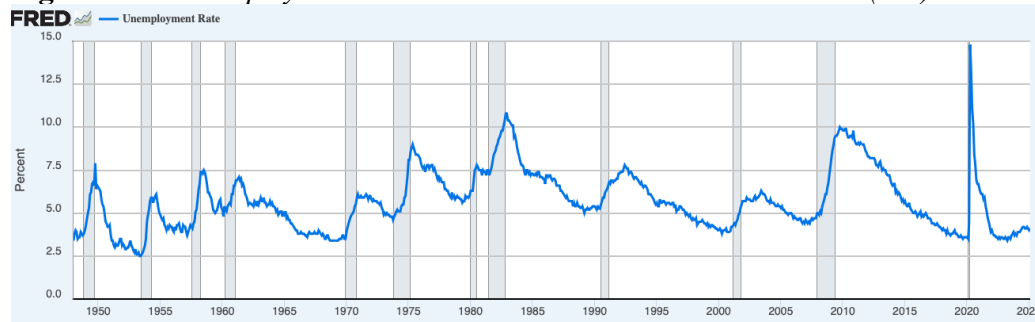


Referring to Figure 4, one notes the decrease in the Velocity of M1 during the recessions except for slow increase in the recession around 1974.

Figure 5. *US Federal Funds Effective Rate UD Federal Reserve Bank St.Louis (n.d.)*



Figure 5 is a very important tool the FRB deploys to deal with inflation. Note that in recent years the FRD used slower pace in introducing changes in the interest compared to the time before 1990.

Figure 6. US Unemployment Rate UD Federal Reserve Bank St.Louis (n.d.)

In Figure 6, we see the sharp increase in unemployment rate during recessions. The rise in unemployment due the COVID 19 crisis was extremely sharp in 2020.

Now we concentrate on evaluating the end-losses of the economy of a nation. If we start with the GDP and GNI we have what the aggregate of the workforces (the Labor) produces annually. Then if we look at the Personal Consumption Expenditure PCE, this is what the population spends, (the Population – the households (including the working population and associated members e.g. family)). It is noted that PCE includes the earnings of working population plus the investments and others see below representative example Table 1 below.

The data found in *U.S. Bureau of Economic Analysis (n.d.)*, was used to calculate the values shown in Table 1.

Table 1. Example 2024 Per Capita Sources and Uses and Percentage of the Totals

SOURCES	SOURCES in \$		Percentage of SOURCES %	
INCOME		67,242.61		100.00%
FROM EMPLOYMENT		42,397.50		63.05%
ADDITIONAL SOURCES -e.	17,939.80		26.68%	
FROM GOVERNMENT	6,879.00		10.23%	

USES	USES in \$		Percentage of Uses %	
INCOME	-	67,242.60		100.00%
Personal consumption		54,052.60		80.38%
Payments (taxes, Interest. Transfer)		10,449.60		15.54%
Personal Savings		2,740.10		4.10%

Recognizing that generally economics focus on the evaluating the input and the outputs of the production of a nation. The view suggested in this paper is to examine the utilizations by the households. There comes what is lost (wasted) or End-Losses between the PCE and what is utilized by the households.

We start by introduction of important parameters that the Federal Reserve Board (FRB) in the US monitors and uses in the decisions they undertake to steer

the economy as needed. The FRD takes steps to alter M1 (Figure 3), VM1 (Figure 4) and the federal funds rate interest Rate (Figure 5) with the obvious concern on Unemployment Rate (Figure 6). The parameters exhibited in Figures 3-6 play important roles in the movement of the CPI's direction (Figure 2)

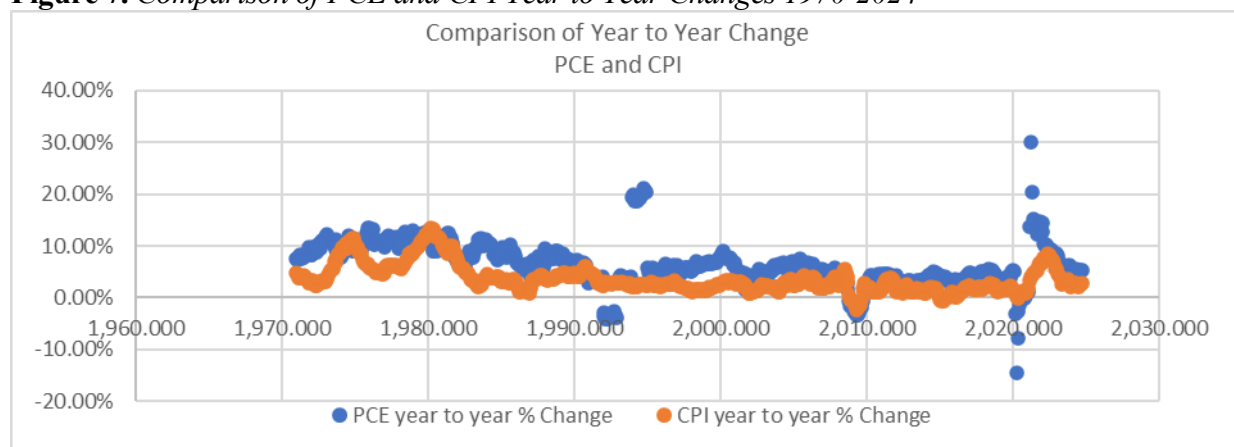
Figure 2 shows the large CPI values prior to recessions. Actions by the FRB leads to the reduction of the CPI, and the Interest rate of Figure 5 is a key parameter that the FRB uses. It is noted that since 2000 generally, the US was in a relatively low interest era till 2022. In this paper, the author opted to focus on the time between 1970 till now. Prior to this time, there were some recessions that were severe and of course the FRB has built on experience and learned lessons from the previous occurrences. The period between 1970 to 2024, there were seven recessions. The recessions cause changes in the trends of the economy. Prior to a recession – during a recession and after the recession. One notes that in the last three decades the FRB has managed to control recessions through monitoring and acting in a timely manner.

Review of US Data

In this section, we discuss select US economic data to gain insights on the working of the different economic indicators. The author chose the order of presenting these parameters as follows:

- A. Under A., the PCE and CPI year to Year Changes represent the spending of the consumers PCE and the changes in the CPI. This is fundamental to the theme of the paper. Comparison of PCE and CPI Year to Year Changes

Figure 7. *Comparison of PCE and CPI Year to Year Changes 1970-2024*



The data shown in Figure 7 were calculated from the sources in *U.S. Bureau of Economic Analysis (n.d.)*, <https://www.bls.gov>. *U.S. Bureau of Labor Statistics (n.d.)*, <https://www.bls.gov>. The exhibited data are examined in detail in the Appendix. The values at about 1993 and 2020 warrant examination.

Table 2. Seven Formally recognized Recessions between 1971 and 2024 National Bureau Economic Research (n.d.)

Recession #	Start	End	Duration Year	Preceding Duration Year	Duration Month	Preceding Duration Month
Rec.1	<u>1,973.92</u>	<u>1,975.17</u>	<u>1.33</u>	<u>12.83</u>	<u>16</u>	154
Rec.2	1,980.08	1,980.50	0.5	4.92	6	59
Rec. 3	<u>1,981.58</u>	<u>1,982.83</u>	<u>1.33</u>	<u>1.08</u>	<u>16</u>	13
Rec.4	1,990.58	1,991.17	0.67	7.75	8	93
Rec.5	2,001.25	2,001.83	0.67	10.08	8	121
Rec.6	<u>2,008.00</u>	<u>2,009.42</u>	1.5	6.17	<u>18</u>	74
Rec.7	2,020.17	2,020.25	0.17	10.75	2	129

The plots in Figure 7 show the year-to-year changes of the PCE and the CPI. As expected generally the PCE change leads the change of the CPI because the calculation of the CPI takes time from collecting the data to producing the results, this time has been reduced in recent years. The effect of the recessions can be seen considering the timings for the seven recessions shown in Table 2. Three recessions lasted about 1.5 year each. The most recent recession associated with the COVID 19 had the shortest duration (2 months). In Table 2, one can see the durations of intervals between successive recessions. Only a little over one year lasted between recessions 2 and 3. It is observed that outside the recessions the amplitude of the PCE year-to-year change is larger than the year-to-year change of CPI. The difference in the amplitudes is much less during the recessions. This is an important observation suggesting that during good times consumers spend more, that is expected and leads to increases of the spending and the waste at time of consumer confidence. However, there are other factors that come to play.

B. GDP & Gross National Income

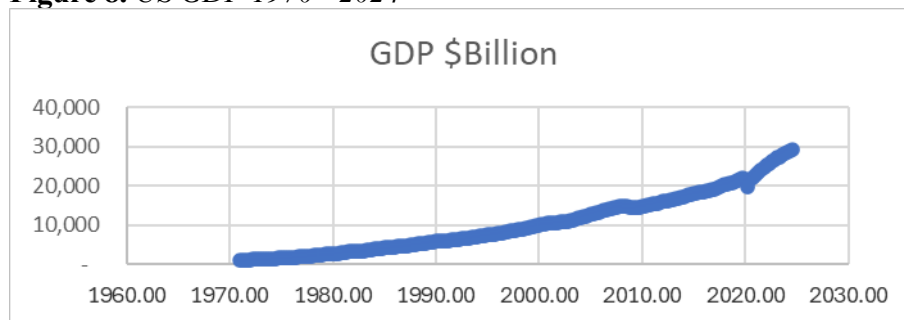
Figure 8. US GDP 1970 - 2024

Figure 9. *GDP Year to Year Change*

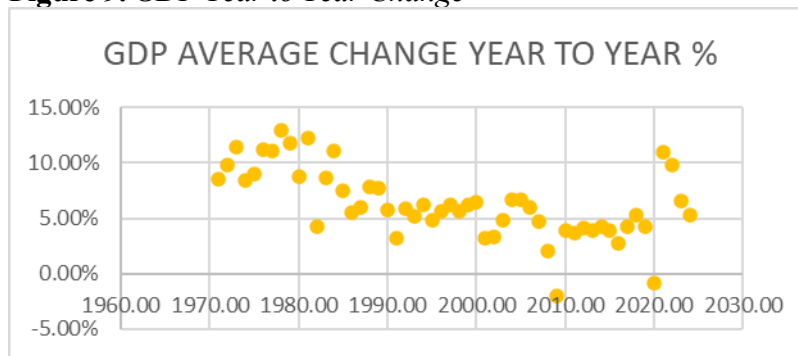
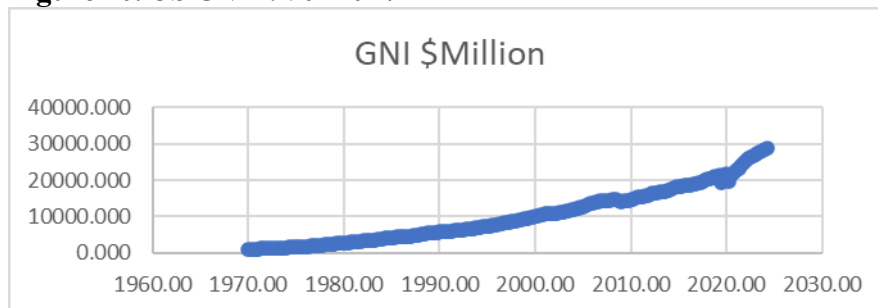


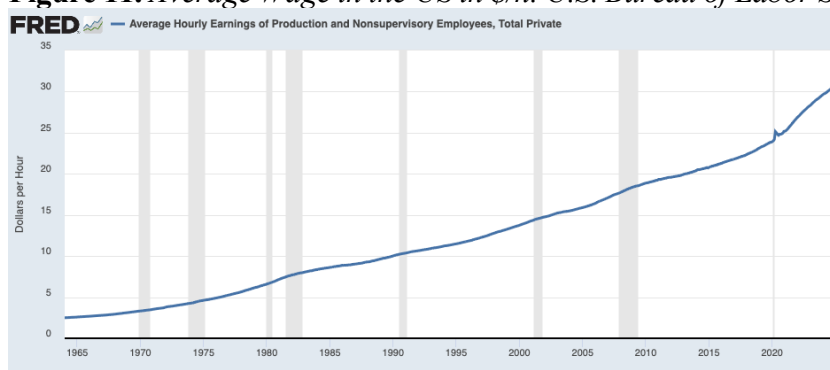
Figure 10. *US GNI 1970 -2024*



The plots in Figures 8, 9 and 10 show how the economy of the US has been doing over approximately 50 years period. The plots of the three Figures exhibit the same trends. Time of lower growth rates are reflected by milder slope, and strong economy is reflected by steeper slope. Innovations play a key factor in the steepness of the growth. Figures 8 and 10 show dips at approximately 2010 and 2020. The plot of Figure 9, it is interesting to see the year-to-year change in the GDP. A word of caution, is that the calculated values in Figure 9 are influenced by the averaging used by the author for quarterly or monthly data of the source data.

C. Average Wage

Figure 11. *Average Wage in the US in \$/h. U.S. Bureau of Labor Statistics (n.d.)*

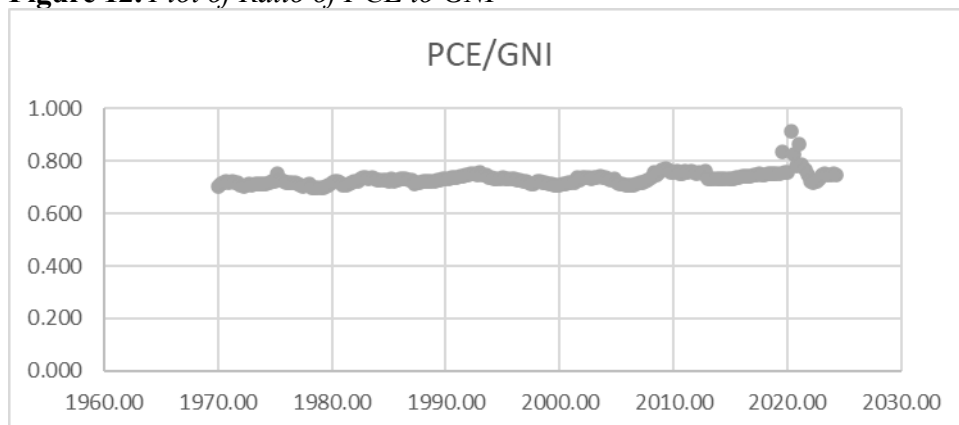


Referring to Figure 11, one sees that recessions temper the rising of average wage, prior to the recessions generally, the wages show steeper rise. Application

of new innovations is accompanied by increase of the average wage. The observed dips in (2010) & (2020), Figure 8 and 10 also could be seen in Figure 11.

D. PCE and GNI

Figure 12. *Plot of Ratio of PCE to GNI*



The plot of the ratio between PCE and GNI is interesting. The ratio is approximately constant or lies in a small band, Again the unusual conditions of COVID 19 about 2020 shows extraordinary change (2020), The author notes, that other economic indicators are available among US data, e.g. the savings, and exports and imports. These parameters have indirect effect to the thrust of this paper and the author opted not to present them. Also, the effect of taxation is beyond the scope of this paper. Further elaboration on this is found under part III.

Analysis of Select US Economic Data (1971-2024) with Focus on Inflation

The key data for the current analysis lie in PCE, and CPI for the time 1971-2024. In addition, the interest rate and the unemployment rate are included in the analysis. The recessions in this time are listed in Table 2, as noted before the recessions warrant close examination. Additionally, the data of the population and the ratio of the working force and population were also used in the analysis. For the CPE the per capita data was the starting point. The chosen data had the categories of goods and services expenditures. Please refer to the Appendix for the details of the steps used in analyzing the PCE data and application of the CPI data to the PCE data to estimate the end-losses from the end consumers. The methodology in the Appendix presents an interesting treatise.

Findings

Takeaway from the Appendix

Referring to Appendix, under step a, using derived PCE, CPI and Interest Rate presentations of 21 phases corresponding to 7 recessions and Era.A and Era.B for the interval between two successive recessions, the durations of the intervals appear in the plate. Notes pertinent the observed trends appear on the right side of the plate. Recessions 4 and 7 show peculiar behaviors (hard to explain). The effect of the interest rate change can be seen. Increased interest rate leads to lowering the CPI one can say PCE leads CPI until the interest rate effect kicks-in. For the Era's the behaviors of the PCE and CPI are logical with the PCE value higher than that of the CPI. The trend of series (5) unemployment goes in the right direction as the interest rate is adjusted. A cautionary remark is to deal with intervals that show high standard deviations in the values. The outcome of step a, Appendix Tables 3.1 and 3.2 listing the CPI values for the various intervals together with duration of the interval. The objective of step b is to obtain approximates to full years durations of the calculated CPI values of Tables 3.1 & 3.2 of the Appendix. For the years of the study, 1970- 2024, the data for annual PCE breakdown available for years 1997-2024 – Table 4.1 of the Appendix. Then the contents of this breakdown were expanded to years 1971 to 1996 through an approximate constant value of the % of the breakdowns (examples are in Table 4.2 of the Appendix). The last step c, of the Appendix involved assuming factors of losses in each category so that the losses sum would add to the CPI for that year as tabulated in table 4.2. These factors were selected to depict the end losses for the CPI of that year. To demonstrate the process, examples of how this process was handled are found in Table 4.3 of the Appendix. This process was then applied to all categories for all years between 1971-2024, Table 4.4 of the Appendix. Table 4.5 shows examples of the losses corresponding to the CPI of each year. Lastly Table 5.1 of the Appendix shows the losses by category that yield CPI value for the year between 2007 to 2024.

The bottom part of Table 5-1 of the Appendix is reproduced here as it captures the final results of the losses between 2007 to 2024.

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Population million	301.7	304.5	307.2	309.8	312.3	314.7	317.1	319.6	322.1	324.6	326.9	328.8	330.5	331.8	332.4	333.6	335.2	336.7
PCE \$Billion	9,782	10,083	9,905	10,274	10,715	11,080	11,401	11,887	12,308	12,736	13,302	13,945	14,429	14,219	18,061	17,528	18,796	19,798
Losses \$billion	287	167	162	146	154	158	163	169	172	177	247	259	288	499	567	960	1,030	546
Losses/PCE %	2.73%	1.66%	1.63%	1.42%	1.44%	1.43%	1.43%	1.42%	1.40%	1.39%	1.86%	1.86%	1.96%	3.51%	3.53%	5.48%	5.48%	2.77%
PRICE \$/kWh	0.115	0.119	0.127	0.125	0.128	0.129	0.130	0.136	0.138	0.135	0.136	0.136	0.136	0.134	0.139	0.152	0.167	0.174
KEI	181	180	174	180	179	181	183	180	180	190	192	198	204	217	218	210	200	198
Losses 0Wh	2,323	1,403	1,276	1,172	1,205	1,229	1,249	1,246	1,244	1,312	1,815	1,812	1,872	3,718	4,088	6,330	6,168	3,138

Business Cycle Indicators

From *Wessels WE(2012), P. 618*, each month, the U.S. Department of Commerce publishes a series of economic indicators (three), including the widely followed leading indicator (10 components), coincident indicator (4 components) and lagging indicator (7 component) are designed, respectively, to lead, coincide, and

lag the business cycle. The need for all this data is clear as the FRB must have rigorous and complete set of data to make the appropriate decisions in the right time. This reflects the complexity of getting a good handle on the anticipation of a business cycle. The author recognizes the difficulties but through this paper he attempted to focus on what could be the main factors. To test his hypothesis (the premise of inflation is function of end-losses). He opted for the Interest rate, unemployment affecting CPI and CPE as outlined in part II and the Appendix.

Other Parameters

An important factor that affects the GDP and hence the parameters that have been studied in this paper, is the National Debt, there is the obvious impact to now and the future.

Demographic changes and increase of the % of the work force of the population has bearing on many economic indicators.

Taxes, and incentives that induce the households to invest and save are obvious factors that influence the sources and uses per Table 1. Recognizing that there is a large element of how the public perceives the conditions these two factors is another level that also dependent on the strata (segments) of the society. For instance, some choose to invest in stock and other financial instruments, they follow the financial markets e.g. DJ, S&P 500, The financial markets provide a dynamic interaction of the wide spectrum of the components of the indicators of Business Cycles. Others, invest in Real Estate.

There are wide range of soft factors that affect the behaviors of the end customers and have a bearing on the end-losses, the interest in sports, recreation, travels and engagement in community activities. The influence of media, advertisements, and social media. Affluence and the careless attitudes influence end-losses.

- **Analogy of end-losses in Economy to end losses in an Electrical System.**
In an ES, if we focus on the end customers, we see a financial negative impact on the end user that is not prudently watching his/her electricity consumption. The aggregate of the end losses means waste on the scale of the society and have an undesirable effect on the economy of the nation. And as have now been well recognized the unnecessary production of electricity is accompanied by undesired climate impact. If the generation of that extra electricity that could be avoided, is from fossil fuels, then we have deal with GHG (greenhouse gases) that we should avoid. There is a similar parallel in the economy that this paper brings upfront. A reduction of the end-losses means has an accompanying reduction of the avoided production that eventually goes to waste. This comes on the avoidable depletion of resources such as mined material etc.

Sustainability/Conservation/Waste

The increase in the end losses has undesirable effects and hence effort on various levels should be exerted to minimize the end-losses, that is part of the sustainability theme of the UN established - (2015). In the advanced economies, the findings noted in the previous section point to the economic benefits and could lead to suggestions of ways to combat end-losses. In developing economies, the attention to reducing the end-losses could financial losses specially for the needy part of the society. Thus, programs that foster conservation and reduction of waste & perhaps the recirculation of waste.

Concluding Remarks

The following can be concluded:

1. The Knowledge Energy Index stipulating knowledge as a high-level energy, resulted in steering the author's thought process to focus on the end-losses at the end-consumers as the cause of inflation.
2. The analysis methodology of the Appendix enabled gaining insights for the interplay of key economic parameters during periods of business cycle. The methodology though relatively simple, still uncovered detailed characteristics. The methodology included some features to cope with unavailability of some data. If complete sets of economic data are available more refined results could be obtained. The methodology may be expanded for use in modeling for economic analysis.
3. The obtained results support or make the premise that end-losses are behind inflation plausible.
4. Taking the examination of what happens at the end customer, is not usually addressed in Macroeconomics. It is recommended to investigate the behaviors of households to quantify the end-losses. This can contribute to sustainability programs.

Acknowledgements

The author dedicates this work to the late Economics Professor Dr. Ibrahim Oweiss from George Town University who passed away in November 2023. Professor Oweiss collaborated with the author since 1988 as noted earlier in the paper. Dr. Oweiss was instrumental in the joint effort that produced the first book in 2002. Dr. Oweiss inspired the author to take on further work building on the 2002 book.

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Appendix

Details of the Analysis Methodology

In this Appendix, the author presents the details of the methodology he used. He opted to include the ample details. He acknowledges that he uses in some instances judgmental assumptions, that can be subject to change, but nevertheless the author feels that different reasonable assumptions will not alter the outcome.

The analysis starts from published US economic data – sourced from FRED (n.d.), BEA (n.d.), BLS (n.d.). These are sourced data with superscript “s”. The data that the author generated has superscript “d” for derived. The derived data include statistical data e.g. averages, standard deviation etc. In some instances, because of the lack of the source data he could not locate for some periods, he introduced some derived data based on approximate trends he could establish from the source data. A particular importance the author put on deriving year to year changes for CPE^s, CPI^s and FRB set Interest Rate^s. Depending on the available sourced data being monthly, quarterly, the author worked out the derived year to year changes. The relevance of the year-to-year changes of the three parameters CPE^s, CPI^s and FRB set Interest Rate^s is clear from the discussions in the body of the paper. The derived year-to-year CPE^d, CPI^d and FRB set Interest Rate^d are central for the analysis covered in this Appendix. As noted earlier in some instances, the author used select source data to establish trends of the behavior of some parameters compared to other parameter(s). Examples of these are found in Figure 7 in the body of the paper. The author, started from per capita source data and used the source of population and the working- force data to obtain the aggregate US economy values (totals) or vice versa to obtain per capita.

The author chose the period between 1971-2024 as it is the most recent and reflects what was learned over a relatively long time. The effects of recessions as noted in the discussions of the paper have profound impacts on the economic data, and hence the treatment of the derived year-to-year CPE^d, CPI^d and FRB set Interest Rate^d have been divided to two types of periods i) recession periods, ii) normal economy growth- referred to as ERA's. For the recession period the official recession durations listed in Table 2 of the paper were expanded to include short times pre the official (formal) recession and post the formal recession. derived year-to-year CPE^d, CPI^d and FRB set Interest Rate^d.

The analysis proceeded in three major steps (A, B and C):

- A. (Step 1) The data of CPE^s, CPI^s and FRB set Interest Rate^s of Figures 7, 2 and 5 were investigated in detail with particular attention to the formally declared seven recessions in Table 1 of the main paper. Further, the Employment Rate (Figure 6) was added to complement the view of the three basic noted parameters. Since the data used in the analysis are per capita, an Adjusted Employment Rate was used to factor the working % of the population. For each of the seven formally recognized recessions the interval was expanded to include a pre and after recession times, the expanded recession period is referred to as Overall, (1, 2, 3, --, 7, refer to the seven

recessions). Then in between the overall recessions, a period rereferred to as Era was used. (I, II, III, ---VII, seven Era's). Further, the author recognized two phases in the Era's one following the Overall of the preceding, the other is designated by B prior to the start of the following recession. These Overall-recession noted by A and one prior to the next Overall=recession noted by B, these can be seen e.g. II.A and II.B respectively for Era II.

This step concluded with establishing the average values for each of the 21 periods (7 Overall recessions, 7 EraA and 7 EraB). For each period, the average values for the derived values of CPE^d, CPI^d and FRB set Interest Rate^d and Unemployment were calculated. These were supplemented with the Standard deviation values.

Recessions

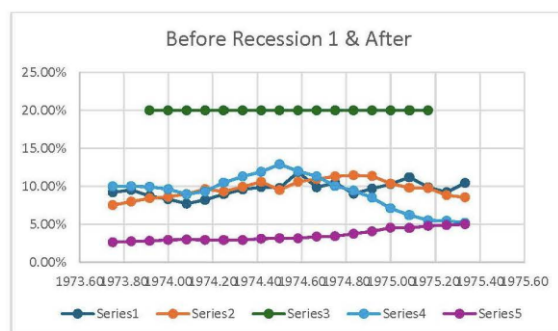
Plates 1-1 to 1-7, show the data for the 7 recessions. For each recession, the overall time was used as a basis, and in the plate for each recession one can see the table containing the key data for the recession. Tabular form at the top, Plots for the variation of key parameters is in the bottom of the plate. On the right side, of the table and the plot, supplementary notes have been entered with the aim of high lighting the different behaviors among the 7 recessions. Please note in the plot series (3) shows the formal duration of the recession.

Plate 1-1. Recession 1

Recession 1	Start	End	Duration	
			Years	Months
Overall	1973.75	1975.3	1.58	19
Pre	1,973.75	1,973.92	0.17	2
Recession	1,973.92	1,975.17	1.33	16
After	1,975.17	1,975.33	0.17	2
OVERALL	PCE(1)	CPI(2)	Recession(3)	Interest(4)
Average	9.61%	9.69%		9.28%
STDEV	0.99%	1.15%		2.29%

(1) PCE, (2) CPI, (3) Recession, (4) Interest.

- Overall Duration 18 months, recession 16 months, short pre and short after.
- PCE and CPI are very close.

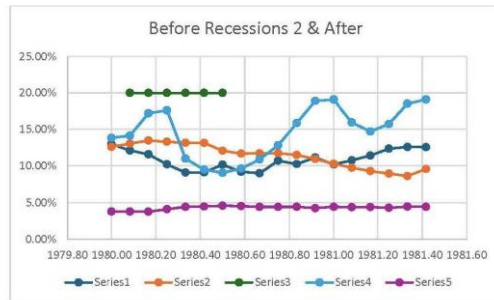


- Interest rate drops at the tail end and CPI starts to turn down.
- Unemployment Rate climbs at the later stage of the recession.

Plate 1 -2. Recession 2

Recession 2	Start	End	Duration	
			Years	Months
Overall	1,980.00	1,981.42	1.42	17
Pre	1,980.00	1,980.08	0.08	1
Recession	1,980.08	1,980.50	0.42	5
After	1,980.50	1,981.42	0.92	11
OVERALL	PCE(1)	CPI(2)	Recession(3)	Interest(4)
Average	10.84%	11.36%		14.63%
STDEV	1.32%	1.63%		3.50%

- Overall duration 17 months, 1 month pre , and 11 month after.
- Average CPI higher than that of PCI.

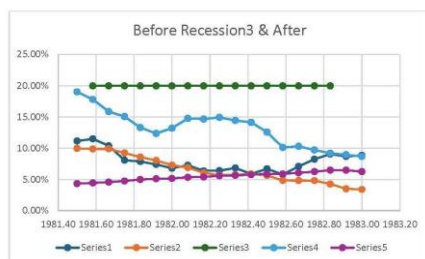


- CPI is lower than CPI early on, but changes to be higher later.
- Interest rate increased three occasions, two occurrences in after.
- Unemployment stays at the same level in after.

Plate 1 -3. Recession 3

Recession 3	Start	End	Duration	
			Years	Months
Overall	1981.50	1982.92	1.42	17
Pre	1,981.50	1,981.58	0.08	1
Recession	1,981.58	1,982.83	1.25	15
After	1,982.83	1,982.92	0.09	1
OVERALL	PCE(1)	CPI(2)	Recession(3)	Interest(4)
Average	7.86%	8.72%		13.37%
STDEV	1.72%	2.09%		2.88%

- Overall duration 17 months, 1 month pre , and 1 month after.
- Average **CPI** larger than Average PCE.

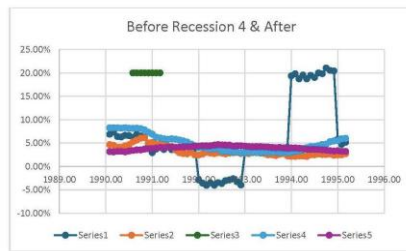


- Interest rate decreasing and then increased in the middle of the recession time, followed by decrease near the end of the recession
- Unemployment rate climbing up and flattens in after.

Plate 1 -4. Recession 4

Recession 4	Start	End	Duration	
			Years	Months
Overall	1,990.08	1,995.17	5.08	61
Pre	1,990.08	1,990.58	0.50	6
Recession	1,990.58	1,991.17	0.67	8
After	1,991.17	1,995.17	4.00	48
OVERALL	PCE(1)	CPI(2)	Recession(3)	Interest(4)
Average	5.92%	3.26%		4.90%
STDEV	7.56%	1.07%		1.84%

- Overall duration 61 months, 6 month pre and 48 month after.
- Average PCE larger than Average CPI.
- **STDEV for PCE is very high.**

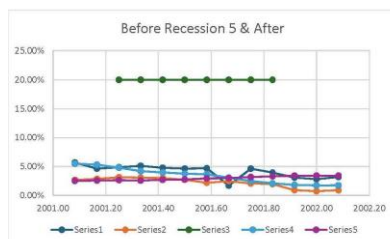


- The drop the CPE and increase during the after i is noted.
- The CPE, CPI and Interest rates as well as the unemployment rate are close for most of the time.

Plate 1-5. Recession 5

Recession 5	Start	End	Duration	
			Years	Months
Overall	2,001.08	2,002.08	1	12
Pre	2001.08	2,001.25	0.17	2
Recession	2,001.25	2,001.83	0.67	8
After	2,001.83	2,002.08	0.25	3
OVERALL	PCE(1)	CPI(2)	Recession(3)	Interest(4)
Average	6.93%	2.28%		4.52%
STDEV	4.49%	0.62%		1.56%

- Overall duration 12 months, 2 months pre , and 3 months after.
- Average PCE is higher than average CPI.
- **STDEV is high for PCE.**

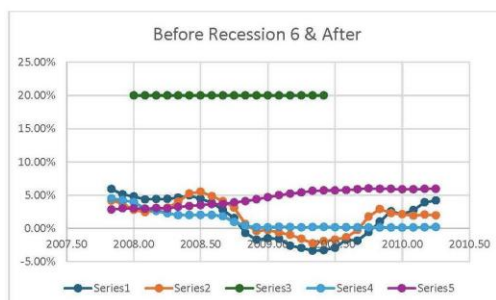


- Towards the end of the recession a dip in PCE.
- Unemployment rate flat and drops in after.

Plate 1-6. Recession 6

Recession 6	Start	End	Duration	
			Years	Months
Overall	2007.83	2010.25	2.42	29
Pre	2007.83	2,008.00	0.17	2
Recession	2,008.00	2,009.42	1.42	17
After	2,009.42	2010.25	1.08	13
OVERALL	PCE(1)	CPI(2)	Recession(3)	Interest(4)
Average	1.43%	1.66%		1.15%
STDEV	3.13%	2.30%		1.39%

- Overall duration 29 months, 2 months pre , and 13 months after.
- Average **CPI** larger than Average PCE.
- **STDEV is high for PCE, CPI and Interest.**

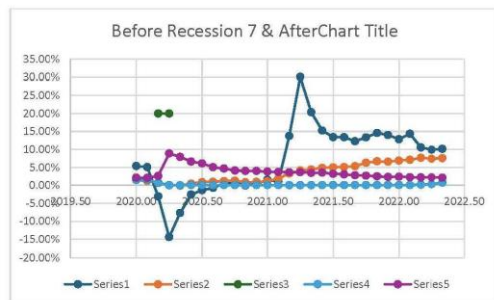


- PCE, CPI and interest rate drop in the latter part of the recession to negative values and then PCE & CPI climb in the after.
- Unemployment rate remains in the early part of the recess then climbs and tapers off later in after.

Plate 1-7. Recession &

Recession 7	Start	End	Duration	
			Years	Months
Overall	2020.00	2022.33	2.33	28
Pre	2020.00	2,020.17	0.17	2
Recession	2,020.17	2,020.25	0.17	2
After	2,020.25	2,022.33	2.08	25
OVERALL	PCE(1)	CPI(2)	Recession(3)	Interest(4)
Average	7.01%	3.51%		0.24%
STDEV	9.34%	2.72%		0.40%

- Overall duration 28 months, 2 months pre , and 25 months after.
- Average PCE is higher than average CPI.
- STDEV is high for CPI

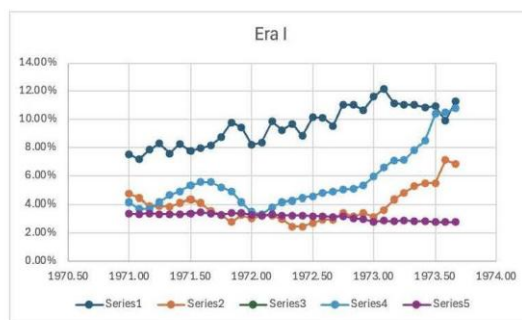


- CPE big drop just following the brief recession to large negative value, and hits a large value in early 2022.
- Unemployment rate tapers off in after.

Era's

In this section, the data for each of the Era's are exhibited for both Era.A and Era.B. Again. in Tabular form and plots showing the variations of the key parameters. On the right side and of the table, and the plots some notes are included. The times of Era.A and Era.B appear in the tables. The averages and STDEV for the Era.A &Era.B are in the tables.

Plate 2 -1. Era I



1:PCE, 2:CPI, 4: Interest, 5: Adjusted Employment Rate

- CPI healthy increase and tapering in last part of I.B
- Increased Interest and increase of CPI in IB
- Decrease in Unemployment rate through I.A and larger decrease in I.B

I	Start	End	Duration	
			Years	Months
	1971.00	1973.67	2.75	33
I.A	1971.00	1972.00	1.00	12
I.B	1972.00	1973.67	1.67	20
		PCE	CPI	Interest
I.A	Averages	8.21%	3.79%	4.57%
	STDEV	0.59%	0.59%	0.72%
I.B	Averages	10.43%	3.95%	6.22%
	STDEV	0.50%	0.50%	0.76%

- Duration total of 33 month
- I.A
 - Averages PCE > CPI
 - STDEV low compared to Averages
- I.B
 - Averages PCE > CPI
 - STDEV low compared to Average

Plate 2 -2. Era II

II	Start	End	Duration	
			Years	Months
	1975.42	1979.92	4.58	55
II..A	1975.42	1978.00	2.58	31
II.B	1978.00	1979.92	1.92	23
			PCE (1)	CPI (2)
II..A	Averages	11.14%	5.98%	5.44%
	STDEV	1.02%	0.95%	0.64%
II.B	Averages	11.64%	8.84%	9.69%
	STDEV	0.81%	2.03%	2.08%

- Duration total of 55 month

- II.A

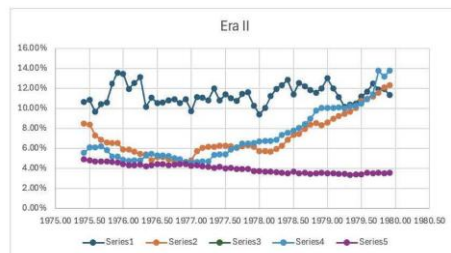
Averages PCE > CPI

STDEV low compared to Averages

- II.B

Averages PCE > CPI

STDEV low compared to Averages



- Fluctuating CPI in II.A & II.B
- Increased interest Rate and CPI in II.B
- Reduced unemployment rate in II.A and tapering down in II.B

Plate 2-3. Era III

III	Start	End	Duration	
			Years	Months
	1983.00	1990.00	7.08	85
III..A	1983.00	1987.00	4.00	48
III.B	1987.00	1990.00	3.00	36
			PCE (1)	CPI (2)
III..A	Averages	8.57%	2.90%	8.51%
	STDEV	1.59%	0.99%	1.37%
III.B	Averages	7.51%	3.98%	7.86%
	STDEV	0.93%	0.53%	1.18%

- Overall Duration 85 months

- III.A

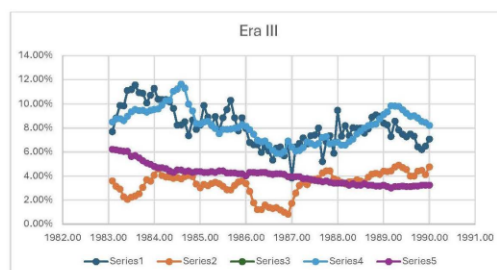
Averages PCE > CPI

STDEV low compared to Averages

- III.B

Averages PCE > CPI

STDEV low compared to Averages



- PCE and Interest rate similar path in III.A & III.B.
- CPI drops as III.B
- CPI drops as III.B commencement is approached.
- Unemployment rate initially large and later small decreases in III.A, III.B

Plate 2 -4. Era IV

IV	Start	End	Duration	
			Years	Months
	1995.25	2001.00	5.83	70
IV..A	1995.25	1998.67	3.42	41
IV.B	1998.67	2001.00	2.33	28
			PCE (1)	CPI (2)
IV..A	Averages	5.60%	2.21%	5.51%
	STDEV	0.60%	0.57%	0.22%
IV.B	Averages	7.20%	2.50%	5.54%
	STDEV	0.67%	0.70%	0.71%

- Total Duration 70 months

- IV.A

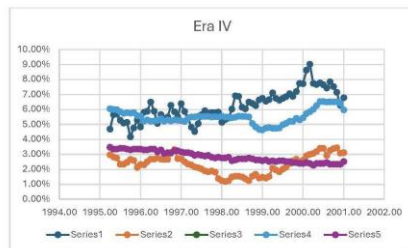
Averages PCE > CPI

STDEV low compared to Averages

- IV.B

Averages PCE > CPI

STDEV low compared to Averages



- CPE fluctuating in IV.A but shows growth at the start of IV.B and tapering off later in IV.B.
- CPI fluctuating early in IV.A and decreasing later before it climbs up in IV.B.
- Interest held at a level in IV.A and then increased in IV.B

Plate 2 -5. Era V

V	Start	End	Duration	
			Years	Months
	2002.17	2007.83	5.75	69
V.A	2002.17	2004.75	2.58	31
V.B	2004.75	2007.83	3.08	37
			PCE (1)	CPI (2)
V.A	Averages	4.63%	1.87%	1.40%
	STDEV	0.86%	0.49%	0.29%
V.B	Averages	5.95%	2.74%	3.52%
	STDEV	0.73%	0.80%	1.65%

- Total Duration 69 months

- V.A

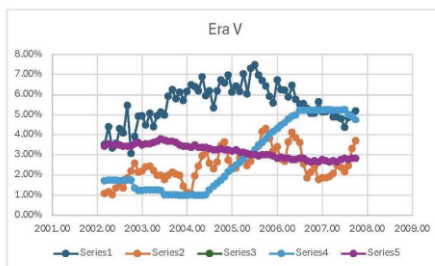
Averages PCE > CPI

STDEV low compared to Averages

- V.B

Averages PCE > CPI

STDEV low compared to Averages

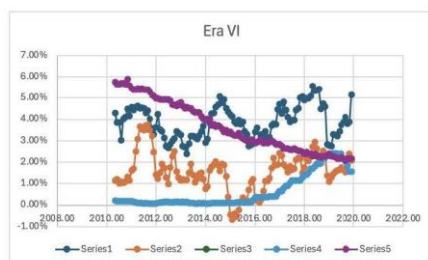


- PCE increase in V.A and drops in V.B
- CPI stays subdued in V.A and climbs in V.B
- Interest Rate increase in V.B

Plate 2 -6. Era VI

VI	Start	End	Duration	
			Years	Months
	2010.33	2019.92	9.67	116
VI.A	2010.33	2016.92	6.58	79
VI.B	2016.92	2019.92	3.00	36
		PCE (1)	CPI (2)	Interest (4)
VI.A	Averages	3.69%	1.41%	0.16%
	STDEV	0.64%	0.98%	0.11%
VI.B	Averages	4.30%	1.96%	1.66%
	STDEV	0.79%	0.43%	0.57%

- Total Duration 116 months
- VI.A
 - Averages PCE > CPI
 - STDEV low compared to Averages
- VI.B
 - Averages PCE > CPI
 - STDEV low compared to Averages

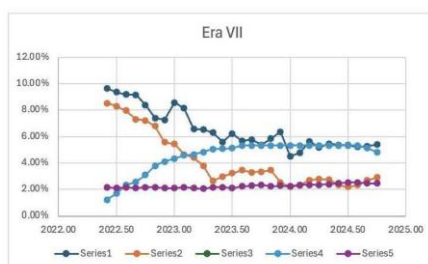


- Fluctuating PCE in VI.A & VI.B
- Fluctuating CPI with large drop as VI.B commences.
- Interest Rate increases at steep pace in V.I B
- Unemployment Rate continued decrease in Vi.A & VI.B

Plate 2-7. Era VII

VII	Start	End	Duration	
			Years	Months
	2022.42	2024.75	2.42	29
VII.A	2022.42	2023.42	1.00	12
VII.B	2023.42	2024.75	1.33	16
		PCE (1)	CPI (2)	Interest (4)
VII.A	Averages	7.86%	5.48%	3.64%
	STDEV	1.34%	2.02%	1.32%
VII.B	Averages	5.46%	2.77%	5.27%
	STDEV	0.47%	0.46%	0.14%

- Total Duration 29 months
(VII.B still to continue beyond 2024)
- VII.A
 - Averages PCE > CPI
 - STDEV low compared to Averages
- VII.B
 - Averages PCE > CPI
 - STDEV low compared to Averages
- PCE & CPI decrease in VII.A and PCE flatten in VII.B.
- The interest rate increased in VII.A and flattens in VII.B
- Unemployment rate was flat and increased toward the end VII.B considered.

**Notes**

Excessive changes encountered in the CPE year to year, particularly in recessions and prior & after.

The CPI year to year shows large amplitude changes mainly in recessions and prior & after.

Long formal recessions longer approximately 1.5 year or longer.

Two short formal recessions with only a brief recovery. Formal recession 7 (COVID 19) was very short.

Year to year interest rate changes mostly exhibit small amplitudes.

The Adjusted Unemployment Rate year to year change generally has a slower pace.

Following a recession, the early part Era.A mostly has low CPI accompanied by lower interest rate compared to those before the recession. In the Era.B phase the CPI climbs.

Timeline & Preparation for inputs to the next step (2)

Based on the information of the recessions in Plate 1 and the Era's in Plate 2, the timeline for the period between 1971 to 2024 is compiled and is shown in Plate 3-1 with associated summaries.

From the data shown in plate 3.2, values for each year between 1971 to 2024 to be used in the simulations of the next step (4) is organized.

Plate 3-1. *Table showing the order of the 21 Intervals for the Recessions, Era 'A's & Era.B's*

Phase	CPI	Start	End	Duration (years)
I.A	3.79%	1971	1972	2
I.B	3.95%	1973		1
Recession 1	9.69%	1974	1975	2
II.A	5.98%	1976	1978	3
II.B	8.84%	1979		1
Recession 2	11.36%	1980		1
Recession 3	6.72%	1981	1982	2
III.A	5.98%	1983	1987	5
III.B	3.98%	1988	1989	2
Recession 4	3.26%	1990	1994	5
IV.A	2.21%	1995	1998	4
IV.B	2.50%	1999	2000	2
Recession 5	2.28%	2001		1
V.A	1.87%	2002	2005	4
V.B	2.74%	2006	2007	2
Recession 6	1.66%	2008	2009	2
VI.A	1.41%	2010	2016	7
VI.B	1.96%	2017	2019	3
Recession 7	3.51%	2020	2021	2
VII.A	5.48%	2022	2023	2
VII.B	2.77%	2024		1

Plate 3-2. Table showing the twenty-one Phases' Recessions, Era.A's & Era.B's in the increasing CPI

Phase	CPI	Inflation Level	Start	End	Duration (years)
VI.A	1.41%	Very Low	2010	2016	7
Recession 6	1.66%		2008	2009	2
V.A	1.87%		2002	2005	4
VI.B	1.96%		2017	2019	3
IV.A	2.21%	Low	1995	1998	4
Recession 5	2.28%		2001		1
IV.B	2.50%		1999	2000	2
V.B	2.74%		2006	2007	2
VII.B	2.77%	Medium	2024		1
Recession 4	3.26%		1990	1994	5
Recession 7	3.51%		2020	2021	2
I.A	3.79%		1971	1972	2
I.B	3.95%	High	1973		1
III.B	3.98%		1988	1989	2
VII.A	5.48%		2022	2023	2
II.A	5.98%		1976	1978	3
III.A	5.98%	Very High	1983	1987	5
Recession 3	6.72%		1981	1982	2
II.B	8.84%		1979		1
Recession 1	9.69%		1974	1975	2
Recession 2	11.36%		1980		1

- B. (Step 2) Data for main components of the Annual PCE per Capita for the year 1997 to 2022 together with CPI and Interest Rate are used to identify estimated losses at the end consumers from these components from the typical per capita expenditures. The estimates were calculated using assumed composition of the components for each period are shown in tables of Plate 4-5. The author was unable to find the comparable components for two periods 1971-1996, and for 2023-2024. Based on the nearly constant ratios of these components as can be seen from the second part of Plate 4, the author extended this to the split of these components for these periods from the data between 1997 and 2022, respectively. The data in Plate 4-1, are merely the % of the components of the source data relative the PCE per capita.

Plate 4-1. *Weights of the components of the PCE for some years between 1997-2022*

#	Description	Unit	1997	2010	2019	2020	2021	2022	1997-2022	
									Average	STDEV
1	PCE	\$/per Capita	20,308	33,164	43,659	42,853	48,318	52,542	33,669	8,373
3	Durable goods	% of 1	12.9%	10.2%	10.6%	11.5%	12.5%	12.2%	11.8%	1.3%
4	Motor vehicles and parts	% of 1	5.3%	3.4%	3.8%	3.9%	4.4%	4.2%	4.3%	0.8%
5	Furnishings and durable household equipment	% of 1	2.9%	2.3%	2.4%	2.7%	2.8%	2.7%	2.7%	0.3%
6	Recreational goods and vehicles	% of 1	3.2%	2.9%	3.0%	3.6%	3.8%	3.7%	3.2%	0.3%
7	Other durable goods	% of 1	1.6%	1.6%	1.4%	1.4%	1.6%	1.5%	1.6%	0.1%
8	Nondurable goods	% of 1	23.3%	22.1%	20.9%	21.7%	21.8%	22.1%	22.1%	0.6%
9	Food and beverages purchased for off-premises consumption	% of 1	8.6%	7.7%	7.5%	8.4%	8.0%	8.0%	7.8%	0.3%
10	Clothing and footwear	% of 1	4.5%	3.1%	2.9%	2.6%	2.9%	2.9%	3.4%	0.5%
11	Gasoline and other energy goods	% of 1	2.7%	3.3%	2.4%	1.8%	2.4%	2.9%	2.9%	0.6%
12	Other nondurable goods	% of 1	7.6%	8.1%	8.0%	8.9%	8.5%	8.4%	8.0%	0.2%
13	Services	% of 1	63.8%	67.7%	68.6%	66.8%	65.7%	65.8%	66.1%	1.6%
14	Household consumption expenditures	% of 1	61.9%	64.8%	65.7%	63.4%	62.8%	62.7%	63.4%	1.4%
15	Housing and utilities	% of 1	18.2%	19.0%	17.7%	18.8%	17.6%	17.4%	18.1%	0.4%
16	Health care	% of 1	14.3%	16.6%	17.1%	16.6%	16.4%	15.9%	15.7%	1.1%
17	Transportation services	% of 1	3.8%	3.0%	3.3%	2.5%	2.9%	3.2%	3.3%	0.3%
18	Recreation services	% of 1	3.8%	3.9%	4.1%	3.3%	3.6%	3.7%	3.8%	0.2%
19	Food services and accommodations	% of 1	6.2%	6.2%	7.0%	5.8%	6.6%	7.1%	6.3%	0.4%
20	Financial services and insurance	% of 1	7.4%	7.5%	7.9%	8.1%	7.6%	7.2%	7.7%	0.3%
21	Other services	% of 1	8.2%	8.7%	8.5%	8.3%	8.2%	8.3%	8.5%	0.2%

From the data found in BEA (n.d.), the author extracted the values of the major components of the goods (durable, nondurable) and services and used the % of the PCE of each year. Plate 4.1 shows some of the computed percentages for some years. The last two columns, show the average % and the standard deviations among the % for the period 1987-2022.

Plate 4-2. Expanding the period 1997-2022 to years before (1971-1996) and after (2023-224)

#	Description	1971	1972	1980	1996	1997	2020	2021	2022	2023	2024
3	Durable goods	12.92 %	12.92 %	12.92 %	12.92 %	12.92 %	11.47 %	12.51 %	12.16 %	12.16 %	12.16 %
4	Motor vehicles and parts	5.29%	5.29%	5.29%	5.29%	5.29%	3.85%	4.37%	4.17%	4.17%	4.17%
5	Furnishings and durable household equipment	2.90%	2.90%	2.90%	2.90%	2.90%	2.66%	2.80%	2.73%	2.73%	2.73%
6	Recreational goods and vehicles	3.16%	3.16%	3.16%	3.16%	3.16%	3.57%	3.78%	3.74%	3.74%	3.74%
7	Other durable goods	1.58%	1.58%	1.58%	1.58%	1.58%	1.38%	1.55%	1.51%	1.51%	1.51%
8	Nondurable goods	23.32 %	23.32 %	23.32 %	23.32 %	23.32 %	21.71 %	21.82 %	22.09 %	22.09 %	22.09 %
9	Food and beverages purchased for off-premises consumption	8.57%	8.57%	8.57%	8.57%	8.57%	8.42%	8.03%	7.96%	7.96%	7.96%
10	Clothing and footwear	4.47%	4.47%	4.47%	4.47%	4.47%	2.58%	2.92%	2.86%	2.86%	2.86%
11	Gasoline and other energy goods	2.67%	2.67%	2.67%	2.67%	2.67%	1.82%	2.40%	2.91%	2.91%	2.91%
12	Other nondurable goods	7.60%	7.60%	7.60%	7.60%	7.60%	8.89%	8.47%	8.36%	8.36%	8.36%
13	Services	63.76 %	63.76 %	63.76 %	63.76 %	63.76 %	66.82 %	65.68 %	65.76 %	65.76 %	65.76 %
14	Household consumption expenditures	61.85 %	61.85 %	61.85 %	61.85 %	61.85 %	63.41 %	62.82 %	62.72 %	62.72 %	62.72 %
15	Housing and utilities	18.24 %	18.24 %	18.24 %	18.24 %	18.24 %	18.84 %	17.65 %	17.44 %	17.44 %	17.44 %
16	Health care	14.29 %	14.29 %	14.29 %	14.29 %	14.29 %	16.58 %	16.40 %	15.86 %	15.86 %	15.86 %
17	Transportation services	3.83%	3.83%	3.83%	3.83%	3.83%	2.52%	2.86%	3.21%	3.21%	3.21%
18	Recreation services	3.76%	3.76%	3.76%	3.76%	3.76%	3.29%	3.57%	3.74%	3.74%	3.74%
19	Food services and accommodations	6.20%	6.20%	6.20%	6.20%	6.20%	5.80%	6.56%	7.06%	7.06%	7.06%
20	Financial services and insurance	7.39%	7.39%	7.39%	7.39%	7.39%	8.09%	7.63%	7.15%	7.15%	7.15%
21	Other services	8.15%	8.15%	8.15%	8.15%	8.15%	8.29%	8.16%	8.26%	8.26%	8.26%

In plate 4-2, the red entries are extrapolated for years 1971-1986, and years 2023-2024. The extrapolations use the %'s of last available year. This was justified in view of nearly constant percentages among the data of years 1987-2022 as shown in the last two columns of Plate 4-1.

Plate 4-3. Example of Calculating the Losses for one selected Target CPI Rate

												1997-2022	
#	Description	Losses	197 1	199 6	199 7	201 0	202 0	202 1	202 2	202 3	202 4	Averag e	STDEV
1	PCE Per capita	Selecte d %	3354	1936 0	2030 8	3316 4	4285 3	4831 8	5254 2	5607 5	5868 2	33669	8373
4	Motor vehicles and parts	3.00%	13	75	79	102	147	181	192	205	214	117	26
5	Furnishings and durable household equipment	0.30%	1	3	3	3	5	6	7	7	7	4	1
6	Recreational goods and vehicles	0.60%	1	3	4	5	7	8	9	9	10	5	1
7	Other durable goods	1.80%	2	11	12	17	28	33	35	38	40	19	6
9	Food and beverages purchased for off-premises consumption	4.40%	34	199	208	323	409	464	511	545	570	326	76
10	Clothing and footwear	0.50%	1	8	9	13	18	19	21	22	23	13	3
11	Gasoline and other energy goods	0.80%	1	7	7	8	9	11	12	13	13	9	1
12	Other nondurable goods	5.00%	4	26	27	54	39	58	77	82	85	48	15
15	Housing and utilities	5.50%	34	194	204	346	444	469	504	538	563	335	81
16	Health care	2.00%	10	55	58	110	142	158	167	178	186	107	32
17	Transportation services	1.40%	2	10	11	14	15	19	24	25	26	15	3
18	Recreation services	1.50%	2	11	11	20	21	26	29	31	33	19	5
19	Food service& accommodatio ns	2.50%	5	30	32	51	62	79	93	99	104	54	16
20	Financial services and insurance	1.00%	2	14	15	25	35	37	38	40	42	26	7
21	Other services	5.50%	15	87	91	158	195	217	239	255	266	157	37

In Plate 4-3, to demonstrate the calculations for a particular target CPI rate, (for different years), the entered values in the third column are applied to the values of Plate 3-2. To calculate the losses corresponding to the target CPI Value.

Plate 4- 4. Examples of selected Combinations of Components to obtain the Target CPI for the Interval

#	1	2	4	5	6	9	10	14	15	18	19	21
Interval	VI.A	Rec. 6	VI.B	IV.A	Rec. 5	VII.B	Rec. 4	III.B	VII.A	Rec. 3	II.B	Rec. 2
Target CPI	1.41 %	1.66 %	1.96 %	2.21 %	2.28 %	2.77 %	3.26 %	3.98 %	5.48 %	6.72 %	8.84% %	11.36 %
start year	2010	2008	2017	1,995	2,001	2024	1990	1988	2022	1981	1979	1980
end year	2016	2009	2019	1,998		2024	1994	1989	2023	1982		
Motor vehicles and parts	1.00 %	1.70 %	2.10 %	2.50 %	2.50 %	2.60 %	3.00 %	3.00 %	3.80 %	4.80 %	6.00%	7.50%
Furnishings and durable household equipment	0.20 %	0.20 %	0.20 %	0.20 %	0.20 %	0.20 %	0.30 %	0.30 %	1.95 %	3.00 %	3.90%	5.00%
Recreational goods and vehicles	0.20 %	0.20 %	0.20 %	0.20 %	0.20 %	0.20 %	0.30 %	0.60 %	1.95 %	3.00 %	3.90%	5.00%
Other durable goods	1.00 %	1.00 %	1.00 %	1.00 %	1.00 %	1.50 %	1.20 %	1.80 %	2.50 %	4.80 %	6.00%	7.00%
Food and beverages purchased	2.00 %	2.20 %	2.55 %	3.00 %	3.00 %	4.00 %	4.80 %	5.00 %	6.50 %	6.35 %	8.50%	10.50 %
Clothing and footwear	0.30 %	0.30 %	0.30 %	0.30 %	0.30 %	0.40 %	0.50 %	0.50 %	3.00 %	3.40 %	5.00%	6.00%
Gasoline and other energy goods	0.30 %	0.30 %	0.30 %	0.30 %	0.30 %	0.40 %	0.50 %	0.80 %	3.00 %	3.40 %	5.00%	6.00%
Other nondurable goods	2.00 %	2.00 %	2.00 %	3.00 %	3.00 %	3.80 %	3.90 %	5.00 %	6.50 %	7.00 %	8.50%	10.50 %
Housing and utilities	1.20 %	1.60 %	2.30 %	2.50 %	2.70 %	3.20 %	4.00 %	5.70 %	7.00 %	8.50 %	11.50 %	14.50 %
Health care	1.60 %	1.60 %	1.60 %	1.60 %	1.60 %	1.80 %	1.90 %	2.00 %	3.00 %	4.00 %	5.00%	6.80%
Transportation services	0.70 %	0.70 %	0.70 %	0.70 %	0.70 %	1.00 %	0.90 %	1.40 %	3.00 %	4.00 %	5.00%	6.80%
Recreation services	0.70 %	0.70 %	0.70 %	0.70 %	0.70 %	0.80 %	0.90 %	1.50 %	3.00 %	4.00 %	5.00%	6.80%
Food services and accommodations	0.70 %	0.70 %	0.70 %	0.70 %	0.70 %	0.80 %	0.90 %	2.50 %	3.00 %	4.00 %	5.00%	6.80%
Financial services and insurance	0.70 %	0.70 %	0.70 %	0.70 %	0.70 %	0.70 %	0.90 %	1.00 %	2.00 %	3.00 %	3.50%	7.00%
Other services	1.20 %	1.50 %	1.70 %	2.50 %	2.70 %	4.00 %	4.00 %	5.70 %	7.00 %	8.50 %	11.50 %	14.50 %

In Plate 4-4, examples from the 21 target CPI's (per Plate 3-1 & 3-2) are shown. The numbers in the top row, correspond to the designated intervals of Plate 3-1 / 3-2.

Plate 4-5. Examples of the Estimated Losses for selected Samples of the 21 Intervals

Interval	I.A		Rec. 1		II.A			V.A	VII.A		VII.B
Year	1971	1972	1974	1975	1976	1977	1978	2002	2022	2023	2024
CPI categorization	Medium	Medium	Very high		High			Very Low	High	High	Low
CPI	3.79%		9.69%		5.98%			1.87%	5.48%		2.77%
PCE	3,354	3,643	4,329	4,750	5,239	5,756	6,357	25,550	52,542	56,075	58,682
Durable goods	1,200	1,304	1,569	1,700	1,875	2,060	2,275	9,035	1,026	6,817	7,135
Nondurable goods	755	820	1,009	1,069	1,179	1,295	1,430	5,610	11,606	12,386	12,962
Services	2,154	2,340	2,760	3,051	3,364	3,696	4,082	16,515	34,549	36,872	38,586
Durable goods Losses	16	17	56	61	39	43	48	81	363	387	227
Nondurable goods Losses	42	45	135	148	119	130	144	164	1024	1093	609
Services Losses	70	76	229	251	156	171	189	225	1491	1591	788
All the losses	127	138	420	460	313	344	380	470	2878	3071	1623
All Losses % of PCE	3.79%	3.79%	9.69%	9.69%	5.98%	5.98%	5.98%	1.84%	5.48%	5.48%	2.77%

In Plate 4-5, the target CPI is shown in the fifth row. The author included a categorization of CPI values below 2% as Very Low, between 2 to 3% as Low, between 3 to 5% as Medium, between 5 to 8% as High and above 8% as Very High. The values in 5th to 8th rows give the \$value per capita for the CPE, expenditures in Durable, Nondurable and Services per annum. The calculated value corresponds to the chosen weights of plate 4-3 and plate 4-4.

C. (Step 3) Generalizing to CPE and relating the monetary values of the losses to Energy Units

Building on the results of the simulation of step 2, the losses per capita are generalized for the population. Further, using the KEI index the equivalent energy units (discussed in the body of the paper) for the losses are estimated.

Plate 5-1. End Results

	V.B			VI.A							VIB			Recession #7		VII..A		VII.B
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
	Low	VERY LOW		Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low	Low	Low	Low	Recession #7		High	High	Low
	2.74%	1.66%				1.41%					1.41%	1.96%		3.51%		5.48%		2.77%
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
PCEper Capita \$	32,356	33,049	32,243	33,164	34,309	35,144	35,955	37,192	38,211	39,236	40,691	42,413	43,659	42,853	48,318	52,542	56,075	58,682
Durable \$	11,178	11,060	10,366	10,724	11,282	11,572	11,815	12,173	12,290	1,200	12,896	13,436	13,715	14,217	16,585	1,026	6,817	7,135
NonDurable \$	7,234	7,447	7,067	7,334	7,775	7,932	8,052	8,267	8,201	755	8,561	8,904	9,104	9,304	10,542	11,606	12,386	12,962
Services \$	21,178	21,989	21,877	22,440	23,027	23,572	24,140	25,019	25,922	2,154	27,795	28,977	29,944	28,636	31,733	34,549	36,872	38,586
Losses Durable	124	76	69	47	49	50	52	54	56	58	108	113	115	187	229	363	387	227
Losses Non Durable	341	200	185	179	193	197	199	203	196	195	251	263	267	477	552	1,024	1,093	609
Losses Services	419	272	273	246	251	256	262	271	281	291	397	414	429	842	925	1,491	1,591	788
Losses Sum \$	884	548	527	472	493	504	513	528	534	544	756	789	811	1,505	1,706	2,878	3,071	1,623
% losses to PCE	2.73%	1.66%	1.63%	1.42%	1.44%	1.43%	1.43%	1.42%	1.40%	1.39%	1.86%	1.86%	1.86%	3.51%	3.53%	5.48%	5.48%	2.77%
Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Population million	301.7	304.5	307.2	309.8	312.3	314.7	317.1	319.6	322.1	324.6	326.9	328.8	330.5	331.8	332.4	333.6	335.2	336.7
PCE \$Billion	9,762	10,063	9,905	10,274	10,715	11,060	11,401	11,887	12,308	12,736	13,302	13,945	14,429	14,219	16,061	17,528	18,796	19,758
Losses \$billion	267	167	162	146	154	158	163	169	172	177	247	259	268	499	567	960	1,030	546
Losses/PCE %	2.73%	1.66%	1.63%	1.42%	1.44%	1.43%	1.43%	1.42%	1.40%	1.39%	1.86%	1.86%	1.86%	3.51%	3.53%	5.48%	5.48%	2.77%
PRICE \$/kWh	0.115	0.119	0.127	0.125	0.128	0.129	0.130	0.136	0.138	0.135	0.136	0.136	0.136	0.134	0.139	0.152	0.167	0.174
KEI	181	180	174	180	179	181	183	180	180	190	192	198	204	217	218	210	200	199
Losses GWh	2,323	1,403	1,276	1,172	1,205	1,229	1,249	1,246	1,244	1,312	1,815	1,912	1,972	3,718	4,088	6,330	6,165	3,135

Plate 5-1 uses the losses estimate of the CPE per capita from Step 2, and the population for the period 2007-2024, to calculate the CPE \$billion. Then losses in for which the average electricity price in the US was available (2007-2024), hence the KEI to calculate the Losses in GWh. Please refer to the body of the paper for further discussions.