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CONTENTS

NOTE ON AN ERROR IN HAZLITT'S ECONOMICS IN ONE LESSON

Walter E. Block[*]

Abstract

This book is the best introduction to economics ever written. It has enticed, educated, and inspired multitudes of people to embrace the teachings of the dismal science. To the extent that there is any understanding of economics on the part of the general public, it is due more to this book than to any other. Yet, I have uncovered one error in it, the rectification of which is my attempt to very slightly improve a priceless book on economics.

Key words: Elasticity; Parity Prices; Costs; Profit

JEL Category: D40, F49.

I owe my career in economics to Hazlitt (1946).[1] I use this book in my introductory microeconomics classes, and am very grateful to its author for writing it. Economics in One Lesson is in my opinion the very best introduction to economics, bar none, ever written.

Why then besmirch this magnificent publication with a criticism of it? There are several justifications for so seemingly an unseemly initiative. First, "you can't have too much of the truth." Truth is its own reward. Truth is the byword of our profession, and, indeed, of every profession worthy of the name. If we do not attempt to wield the "terrible swift sword" of truth wherever it leads us, without fear or favor, we are not worthy of the honorific, "economists." Second, from a pragmatic point of view, better that I, a strong supporter of this book[2] call into question one erroneous point made by Hazlitt, the better to very slightly improve the book, than to have a critic of this author's philosophy do so, in an attempt to discredit it. Thus, a benefit of the present criticism is that it might obviate one made with very different motives than those of the present author.

First the background (Hazlitt, p. 91):

> *"The argument for parity prices ran roughly like this. Agriculture is the most basic and important of all industries. It must be preserved at all costs. Moreover, the prosperity of everybody else depends upon the prosperity of the farmer. If he does not have the purchasing power to buy the products of industry, industry languishes. This was the cause of the 1929 collapse, or at least of our failure to recover from it. For the prices of farm products dropped violently, while the prices of industrial products dropped very little. The result was that the farmer could not buy industrial products; the city workers were laid off and could not buy farm products, and the depression spread in ever-widening vicious circles. There was only one cure, and it was simple. Bring back the prices of the farmer's products to a parity with the prices of the things the farmer buys. This parity existed in the*

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[1] All references to this author, unless otherwise specified, will be to this one publication of his.

[2] A vast understatement.

period from 1909 to 1914, when farmers were prosperous. That price relationship must be restored and preserved perpetually."

What, then, is the problematic passage? It occurs as a part of (Hazlitt's, 2008, p. 95) rejection of "parity prices":

"... when the farmer reduces the production of wheat to get parity, he may indeed get a higher price for each bushel, but he produces and sells fewer bushels. The result is that his income does not go up in proportion to his prices."

When price rises and quantity falls, what happens to total revenue? It all depends upon the elasticity of the demand curve between those two points; e.g., the lower the price and the higher the quantity with which we begin, the higher price and lower quantity at which point we end. If the demand curve is inelastic, the farmers' total revenue rises; if unitary, then it remains the same; and if elastic, then it falls, as we move up and to the left along the demand curve.[3]

Suppose the former. We posit, then, that the demand curve is inelastic[4] at its relevant section. The means the revenue accruing to the farmers rises. Does that logically imply that "his income does not go up in proportion to his prices?" Not necessarily. Hazlitt does not take cognizance of the fact that when quantity falls, why then so do costs. This is true, to be sure, not if he burns his crops. Then, costs do not fall, they even rise, since setting them on fire them is not a costless activity. However, if he does not plant these crops in the first place, he saves on land rent,[5] fertilizer, seeds, power for his tractor, etc. *Thus, his costs decrease.* Then, it is possible, given the cost concatenations, contrary to Hazlitt's statement, the indeed farm income "go up in *more than* proportion to his prices."

Let us consider some numerical examples. We will illustrate this point in three ways. First, with a demand curve that is elastic within the bounds we are considering, second, with one that is inelastic, and, third, with one of unitary elasticity.

1. Elastic case

Suppose price rises from 10 to 11, an increase of 10%, while quantity falls from 100 to 90. Total revenue falls from $1000 to $990, and the elasticity between these two points on the demand curve is 21/19, or elastic. In order to have more than a rise of 10% in income, we must go not from $1000 to $990, but, from $1000 to $1100 or more. This would necessitate a cost saving from the decrease in production of anything more than $110. Posit that the cost saving is $120, when quantity decreases from 100 to 90. Then, revenue will increase from $1000 to $1110, a rise of more than 10%. For costs to decrease by $120 when quantity decreases by 10 units (from 100 units to 90 units) the average cost per unit most decrease by $10; i.e., $12/unit. However, if the original price was $10 per unit, the original cost must have been no more than $10/unit, assuming a viable enterprise.

[3] I say all this arguendo, given Barnett and Block, 2010

[4] This assumption flies in the face of standard microeconomic theory. No firm would knowingly operate where demand is inelastic. Thus, if the firm is operating in the elastic range, an increase in price reduces revenue. "Knowingly" is the key word here. Of course "No firm would knowingly operate where demand is inelastic." But, in the real world, firms do this *un*knowingly. And, a full analysis of the economic situation of the world requires that we not ignore this sector of the economy.

[5] Or the opportunity costs thereof

So, even if the firm were operating at breakeven originally and it raised its price to $11/unit, cost must have dropped from $10/unit to -$2/unit for your scenario to work.

Is this logically possible? Yes. Anything that does not constitute a logical contradiction is possible, and this scenario does not constitute a logical contradiction. Is this plausible? Certainly not under the assumption of a "viable enterprise." But not all enterprises are viable. In the real world, which we presume is the one to which Hazlitt addresses himself, there are always some firms making a profit, others breaking even, and still others undergoing losses. Since we are now discussing agriculture, the latter is more likely than in other industries.[6] It is beyond the scope of the present paper to speculate on any such statistics; all we can say for sure is that for some farmers, this numerical example is likely. Hazlitt warns against (1946, pp. 15-16, emphasis added) "… the persistent tendency of men to see only the immediate effects of a given policy, *or its effects only on a special group,* and to neglect to inquire what the long-run effects[7] of that policy will be not only on that *special group,* but on all groups. Farmers who are losing money are a "special group" that we choose not to ignore.

2. Inelastic case[8]

Suppose price rises from 10 to 20, an increase of 100%, while quantity falls from 100 to 90. Total revenue increases from $1000 to $1800, and the elasticity between these

[6] The number of farming firms and the labor force participation in farming has been undergoing a long term downward trend. See on this AP (1988); U.S Census Bureau, 2014, 2019. According to one source: "In the 1800s, 90 percent of the population lived on farms; today it is around one percent." Source: https://www.google.com/search?client=firefox-b-1-d&ei=w13UXdKeLIm WsQX2-YaQBw&q=+farm+population+historical&oq=+farm+population+historical&gs_l=psy-ab.3...4546.4546..6673...0.2..0.84.84.1.....0....1..gws-wiz.....0i71.S-0drB-rvqA&ved=0ahUKEwiSjO-dm_flAhUJS6wKHfa8AXIQ4dUDCAo&uact=5

[7] Elasticities tend to be higher the greater the length of run. That is, there is more of a response in quantity to price changes the more time firms are given to adjust. In the immediate run, quantity is all but fixed, since little or nothing can be changed with notice of only a few seconds, or even minutes. But, as more and more time is allowed, businesses become more flexible. It is not for nothing that major league pitchers hurl the ball toward the batter at speeds of 80 miles per hour or more. They do not want to give the batter time to adjust. When they pitch warmup to their own teammates before the game, the ball comes in at 40 miles per hour or so, and can usually be hit out of the park.

[8] In the view of mainstream economics, in perfectly competitive markets, we can have equilibrium in the inelastic part of demand curve, although each firm sees it as perfectly inelastic. In contrast, a monopolist, or, a cartel which successfully lobbies for restrictions, they will not operate in inelastic part of demand curve, for both revenues increases and costs decreases – and the cartel would reduce the quantity/increase the price. Austrian economists take a very different view of this matter. For the praxeological school, the important distinction is not between number of sellers (one or a few, monopoly, oligopoly; many, perfect competition), but rather whether or not there is freedom of entry (laissez faire capitalism), or restrictions on entry (crony capitalism or economic fascism). For more on this see Anderson, et. al., 2001; Armentano, 1972, 1982, 1989, 1999; Barnett, et. al., 2005, 2007; Block, 1977, 1982, 1994; Block and Barnett, 2009; Boudreaux and DiLorenzo, 1992; Costea, 2003; DiLorenzo, 1996, 1999, 1985; DiLorenzo and High, 1988; Henderson, 2013; High,1984-1985; Hull, 2005; McChesney, 1991; McGee, 1958; Rothbard, 2004; Shugart, 1987; Smith, 1983; Tucker, 1998A, 1998B.

two points on the demand curve is 3/19, or inelastic. In order to have more than a rise of 100% in income, or a doubling, we must go not from $1000 to $1800, but, from $1000 to $2000 or more. This would necessitate a cost saving from the decrease in production of anything more than $200. Posit that the cost saving is $300, when quantity decreases from 100 to 90. Then, revenue will more than double from $1000 to $2100, a rise of more than 100%. In this case MR = +800/-10 = -80 (per unit). Profit maximization (in this case loss minimization) would require MC = -$80/unit. This implies a cost saving of $20/unit when price starts at $10/unit. Again, if we are analyzing the situation of profit earning farmers, or, those breaking even, this scenario must be rejected. But, as Shakespeare informs us: "There are more things in heaven and earth, Horatio, than are dreamt of in your philosophy." In our philosophy, there are also tillers of the soil who undergo losses.

3. Unitary elasticity[9]

Suppose price rises from 10 to 11, an increase of 10%, while quantity falls from 11 to 10. Total revenue remains at $110, and the elasticity between these two points on the demand curve is 1, or elastic. In order to have more than a rise of 10% in income, we must go not from $110 to $110, but, from $110 to $121 or more. This would necessitate a cost saving from the decrease in production of anything more than $11. Posit that the cost saving is $12, when quantity decreases from 11 to 10. Then, revenue will rise from $110 to $122, an increase of more than 10%. To be sure a cost a saving of $12 for a one unit decrease in sales with an original price of $10/unit means operating at a loss, and then having negative marginal cost. But as we have seen, there is nothing implausible, let alone impossible, about such a situation.

This error is no big deal. It is almost, but not quite, comparable to a typographical error. One would imagine that were Hazlitt to read this note, he would quickly acquiesce in the notion that if the cost savings of producing were sufficient enough, then, yes, the farmers' income could indeed rise more than in proportion to the price increase.

Nor is this error based on fallacious considerations such as the Giffen Good.[10] Here, there is nothing as untoward. It is just a simple failure to note that with a lower quantity, it is entirely possible that the costs of production will fall, and by a large enough amount so as to render Hazlitt's conclusion untrue.

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[9] It is said that production can only take place in the elastic section of the demand curve, since marginal revenue will be less than zero in the inelastic section. But this is not quite true. Yes, it is indeed usually the case; but when losses are being registered, this no longer holds. Our economy is one of profits *and* losses, and it ill behooves us to ignore the latter.

[10] See on this Barnett and Block. 2010; Block, 2012; Block and Barnett, 2012; Block and Philbois, 2018; Block and Wysocki, 2018; Klein, unpublished; Klein and Salerno, Unpublished; Murphy, Wutscher and Block, 2010; Wysocki, and Block, 2018.

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CONSTRUCTAL THEORY AND ECONOMIC CYCLE

Radu Iasic, Cristian Păun[*]

Abstract

More and more economists are talking about an impending crisis, even people who have no economic concerns are waiting for it. Economists discuss the extent and depth of this future crisis and analyze the possible consequences and how we can overcome them. The past fight against the diminution of the amplitude of the economic cycles has proved its limits and the measures taken have only prepared a new cycle and a new crisis. As H. Minsky has observed, the struggle to get out of the straits of a crisis contains the germs of a new cycle. There has been much written about business cycles and there are around 12 theories trying to penetrate in this curious world of regular variations of economic indicators. All these theories have in our opinion a limited view of the economy and attack economic cycles from perspectives that are often fruitless and harmful in the long run. In the last period, a theory created by a Romanian professor who teaches in America, Professor Adrian Bejan, has easily penetrated from physics to the field of economic sciences, and the theory is called the constructal theory. It is a theory that is suitable for both a mathematical - empirical analysis and a priori deductive analysis. It is a theory that provides fertile ground for economic analysis and above all it is a theory that leads to conclusions similar to the Austrian School of Economics. In our opinion it is the theory that brings to light long-term social and economic mechanisms with a strong explanatory and predictive character at the trend level. Objections can be raised against this theory; objections that we will mention at the end of the article. In this article we want to make a brief presentation of the theory in economic vision to relate it to the past economic cycles and crises and especially to the future ones. The theory speaks of many economic flows; flow systems with multi-storey architecture; of hierarchical configurations as they occur naturally; of wealth differences that are a condition of economic existence. The whole social system, according to this theory, is a flow system that evolves over time, with a certain pattern, and evolution has the appearance of systems superposed with a certain configuration. Cycles occur when the decision makers erroneously intervene in the spontaneous architecture of the flow systems due to their misunderstanding. We consider this theory a fertile ground for future research with this vision. Surprisingly, this theory can be related to another theory coming from physics but with major implications in economics, namely the self-organizing criticality theory. But considering the economy of the article we will leave this link for the future.

Keywords: *flow systems, hierarchical architecture, cycles, flows, financial system*.

JEL Codes*:* B530, B410

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Introduction

The authors of this article intend to bring the Constructal Theory built by Professor Adrian Bejan into the economic field. The first part of the paper will consist of a presentation of the mentioned theory; the second part will be the use of this theory as a means of explaining and analyzing the economy and especially the economic cycles. An attempt will also be made to bring together the Constructal Theory and the Austrian School of Economics.

The authors have tried through previous articles to unravel the mystery of economic cycles through classical economic theories. We believe that this article brings a new light to the economy and a new style in seeing things.

Constructal theory

The whole human life is movement, action. Action means flow within an organized framework. A human system in balance with the environment is a dead system with no flow. An organized system tends towards a dynamic balance with the environment, that is, flows between the system and the environment occur (eg information flows).

Every living system spontaneously forms a flow configuration and a certain flow rate. By studying the elements that make up the flow, one can predict the shape and structure of the system. The only purpose of a flow system is to ease the flow. All systems transform their morphology to facilitate flow and gain a succession of models.

To understand the flow systems we must have in mind a river basin of a river. At first the water infiltrates the soil and moves slowly and over short distances then the first streams (channels) are formed in which the speed of movement and the quantity transported is higher. The first channels merge in a certain ratio into a larger channel. And the process continues until you reach a download point. The channels on a higher gear are longer and larger than those on the lower gear, in the channels on the upper gear the water moves with greater speed and mass compared to those with a lower gear.

The architecture of the system appears because only in this way the flow is easy, it acquires rhythm and it can be improved, ie it becomes efficient and evolves. The systems necessarily evolve towards a more efficient flow configuration. The degree of perfectibility of the flow of a system increases, despite and above all due to: the resistance to flow. The emergence of the flow systems and their evolution is spontaneous.

Within this theory it is important to define the concept of system and to establish its limits on the basis of criteria. The object and matter of the flow must be analyzed; between which points the flow takes place; what is the flow surface; channel matter; the quantities carried. Movement means a relationship between two objects and the movement of one in comparison with the other.

At the same time it is necessary to establish what forces of resistance are in the system: control point, neck, friction. The flow is always from large gradients to small ones and is unidirectional and irreversible.

Always within a system with a trained architecture, the flow is of two types: fast and slow. Slow flow is synonymous with diffusion and is carried out over short distances, and at reaching a critical mass the flow channel is formed and flow is made with speed

over long distances. The resistances encountered in diffusion, the time and the displacement speed achieved in this case are equal with those in the fast-flowing stream channels. Example: in the case of an information transmission system. First the information is infiltrated among the subjects, then a critical mass of information accumulates and the first resistances are formed, the first channels of flow appear, channels that unite and form larger channels.

The things created by man have as their purpose: a movement in space with an increasing rate in terms of speed and mass moved and a consumption of energy per unit moved in decline. The movement takes place from a point to a surface or from a surface to a point.

The flow system is self-organized so that the losses in the transported material or energy are as small as possible. The efficiency increases (energy consumption per unit of transported mass) as the material support (which moves and supports the information) is higher. Thus, a spontaneous distribution of the transported material appears, from many small to few large ones, with a certain statistical distribution. The speed increases with the transported quantity.

Each flow system is only a portion of a larger flow system. A flow system has a certain architecture, it is composed of intermediate steps; steps consisting of smaller flow systems each with its configuration. The whole evolves to increase efficiency and decrease resistance.

The social systems are identical to the other systems. They have a certain tree-like architecture, spontaneously emerging and evolving to move at an increased rate of mass, speed (over longer distances). The social system is in permanent change and search for diminished resistance. Social systems are hierarchical; hierarchy what: it goes towards harmony, facilitates flow and makes flow possible. The system as a whole changes and he counts (not the person as an isolated entity). Scientific research and technological development support the flow of materials, information from the social system, diminishing the resistance. The way flow systems evolve is unpredictable.

Engines (flow currents) evolve with brakes (resistances). The environment (context) is an engine brake. The interaction leads to a multiscale channel architecture with a vascularized and hierarchical design. The evolution is for operation with unnecessary dissipation of energy in reduction. For movement the brakes are as important as the engines.

In the economy, energy consumption is directly proportional to the result. The energy consumed creates power and force, and these move mass (information). These aspects related to the fact that the flow structure is hierarchical lead to the conclusion that the wealth is distributed unevenly. Unevenly distributed wealth is a result of natural laws. Energy must be consumed to create movement. Energy has a certain natural substrate. The substances used for energy extraction are not evenly distributed on the surface of the globe, so wealth discrepancies occur.

The solution of poverty eradication is not the destruction or aberrant modification of the flow system but the connection of isolated areas or small flow systems to large flow systems; step by step. The solution is to develop the existing flow systems in a certain area and to connect them to other systems. The worst solution is the destruction of

local systems and the creation of new ones, which have been useful in other areas with different characteristics. It must always be built on something that already exists and has proven its viability over time.

Any innovation creates a new channel through which a new flow emerges, which flows and feeds a new territory, reducing poverty and bringing wealth. Innovation can also open a channel that already existed (but was blocked) and thus flow to include new channels and new territories. Any leak is between a point and a surface or between a surface and a point.

The innovation is individual and favors the flow at a certain point or creates a flow at a certain place. At the same time, the flow from one point influences the flow of the whole system.

Inequality in the distribution of flows within a system occurs even if a perfectly symmetrical and undifferentiated physical system is built. For example, in the case of a system of perfectly equal nodes and with fixed distances between the nodes (system in the form of a grid), any flow that flows through this system differs greatly, in terms of indicators, between the flow areas. The more the source of the flow in the system is subjected to variation pressures, the more the flow in the system differs qualitatively and quantitatively by area.

If we artificially intervene and create a perfectly equal system, then the portion of the system that is closer to the source has a higher flow rate. Those on the periphery will have part of the last remnants of the flow, ie at the periphery the flow tends to zero.

Increasing the size of a system causes the periphery to move away and the center to widen its edges. In order to guarantee the equality between the nodes in terms of flow, each node must be at the same time an input and an output, ie each one is on its own without any connection with the others, just as in the beginning. This is communism.

There is a direct relationship between the complexity of the economic system and the wealth differences within the system. The differences of wealth are natural and arise from the spontaneous configuration of the hierarchical system and from the flows that exist between the components.

There is a direct relationship between the quantity of goods produced in a country and the quantity of movement. The amount of movement can be measured by the fuel needed for travel, consumed at country level. Most innovations simply remove barriers to flow.

In short: the purpose of the systems is to access the resources needed for life. Between wealth and energy consumption the relationship is direct. The system configurations appear as a result of the uneven distribution of resources; increasing complexity is required to cover the entire surface.

Economic innovations favour flow. Money more than the exchange in nature, the same type of currency as compared to several currency models, eliminating customs barriers, using a single language, a single type of alphabet and the same units of measure.

To increase well-being and a sustainable future it is necessary to consume more energy; moving more mass / information. The resources are virtually inexhaustible, always new sources of energy are found, and the solar mass provides practically inexhaustible energy. In fact, solar energy made things move on earth and life appeared.

Each flow starts slowly, then the flow speed increases slowly, it reaches a rapid growth, and finally the growth becomes slow again. All this S-shaped flow system is repeated in all flow systems. The complexity does not result in an increasing speed until the system explosion. Complexity means rational organization according to a certain model for streamlining. A complexity without configuration would block the flow.

Change is essential within a system. Always a free-flowing system changes to streamline the flow. A system that does not change is a system condemned to death. All social innovations, including language and starting from the language reaching the machines and social organization, are realized with the purpose of a greater power of movement. The balance of a system including the social one means death, a system in harmony with the environment is dead.

Within the social system the channels of flow are formed by the collaboration between individuals. Thanks to the collaboration, freight / energy / information is transported.

Growth is just a part of evolution. Evolution first of all means structural complexity of flow, not necessarily dimensional growth. A system must be free to be able to adapt to the flow through it. Obstructing it means taking the first steps towards its destruction. Artificial changes in a complex system block it and send the flow in counter-nature directions that have low efficiency. A forced change modifies the natural flow from one part of the system and sends the current in a direction that the natural evolution avoids due to the decreases registered in efficiency. From all the studies carried out by the construction theory it follows that the constraints made on a natural system (like an economy) can only be harmful.

Free natural systems are constantly improving, that is, to distribute the forces that oppose the movement as evenly as possible over the whole. If the system encounters a higher resistance then it will try to dissipate that resistance into the system. But the resistances in a system will never be uniform, that is, evolution never ends. It strives for perfection, but it will never be achieved. It is necessary to diminish the resources inside the channels along them and at the same time to increase the resistance around the channels for an efficient flow.

Hierarchy is natural in nature and in the organization of society, but hierarchy does not mean inequality and is more predictable. The human society develops through energy consumption and also through energy consumption will solve its problems. The opinions of uniformizing energy consumption and stopping consumption are false and lead to the regression of civilization. The future is about as much energy consumption as possible, but with high efficiency devices (ie they do not waste unnecessary energy in the environment). High energy consumption is required to generate wealth, but efficient consumption (in terms of losses).

Human mechanisms interpose in the path of the fluxes of nature, intercept them and then discharge the accumulated energy elsewhere and in another way. In flow systems, the amount of flow or energy entered is equal to the quantity that comes out. These are linked to the Jevons paradox and Arthur Laffer's paradox. That is, the more energy a system uses efficiently, the more it consumes; respectively, the lower the taxes, the more quantitatively their collection increases, because the economy as a whole grows.

Unused fuel is lost wealth. The chance of development for disadvantaged areas is to be coupled to large and functional flow systems, systems that bring them wealth. Human civilization is a living tissue with knots between which are flow channels for energy flow. Human organizations collect energy and transform it into the environment in the form of movement or loss.

Any flow entails, modifies, penetrates the environment and the materials with which it comes into contact. The placement of cities on large areas and the dimensions of these cities respect a logarithmic function in distribution. Cities are centers of concentration of flow on large areas. The human flow from a certain area is directed towards cities in the sense of flowing from a surface to a point. The flow continues from small cities to larger cities.

Saving means saved movement power. When more energy is consumed in a particular place than is necessary then the surplus economy moves to another place where it is needed. If at some point energy is generated above necessities then it is necessary that this energy be stored and used later or elsewhere. This is achieved through money and capital. Money transfers energy / movement power from those who have excess to those who currently use it.

In economics the rules form flow channels and make the flow easy along the channel and at the same time the transverse losses to the external environment are minimal. The business world with its rules is only a channel system that facilitates flow.

Increasing the dimensions of a system leads to a decrease in operating losses and a reduction in resistance forces. Simultaneously with the increase in size also increases the amount of energy necessary for the operation of this system, quantity that represents a limiting factor. Thus, at the intersection of energy supply and demand, the system will be set up. Increasing the efficiency of the flow through human-built systems will reduce the size of the systems, ie their miniaturization.

Evolution has two aspects. The first is that more and more masses are being transported, and the transport bodies like cars and airplanes are getting bigger and bigger. The second aspect is that the consumption of energy unit per mass unit decreases gradually. The result: the total energy consumption increases, the mass transported increases, but the unit consumption decreases.

An efficient flow system must move an object from one point across the entire surface and not just from one point to another. The flow systems overlap one another and absolutely all have an evolution in S compared to the flow time and power. That is, the flow has a slightly increasing flow rate, will accelerate strongly, stabilize and then a low growth rate followed by disappearance. The disappearance is not preceded by a decreasing flow rate, that is, the flow is not in the form of a Gaussian curve. Human flow systems do not lead to cataclysms, they just overlap with each other for a more efficient and intense flow.

Growth is different from evolution as a concept. The growth of a system is S-shaped, and evolution means a flow system overlapping or evolving from another. The freedom of the social flow system ensures wealth, efficiency and especially longevity. Rigid, bureaucratic systems with cumbersome changes lead to poverty, and their survival is uncertain. Without freedom a system cannot change, cannot adapt to changes, in a word is condemned.

The birth of a flow system can take place in two modes with different flow directions. The first way is by the formation of the smallest channels following an indistinguishable diffuse flow. The training direction is from low to high. The second way is by starting from the mouth of the exit where a main channel is formed, and slowly the secondary channels are formed. In the main channel, an infusion of flow from the neighboring surfaces takes place initially, following these diffusion flows to form their own channels due to the agglomeration and concentration of the flow.

The channels of flow in a social system are formed by the laws of the state. The decentralization of the state does not mean uniformization or a single dimension of channel for all places, but it is the allocation of a certain type of channel that suits an area and its characteristics. In a centralized, bureaucratic, artificially developed state, the center is heavily vascularized to the detriment of undeveloped peripheral areas for which no channels of wealth flow are built. This is about the empire of the U.E.

The flow systems do not replace each other but instead overlap each other, each having its own field of action. Sustainable economic development is in fact the free evolution of human flow systems, so that they can adapt for larger flows, at greater distances and with less fuel on the transported freight unit. The evolution is gradually in small steps, and at a certain step new flow systems can appear that overlap the old ones without replacing them, but only covering a new domain. Each system deals with its own flow pattern.

Existence as a life means a system that has an impact on the environment around it. The more a system has an impact on the environment, the more it transforms it, the more viable, efficient, powerful and durable it is. Something that does not change the environment around it is something dead. By optimizing and changing a living system further changes the world around us.

The evolution of a system is in small steps to find lower resistance in the path of flow, for fluidizing the system as a whole. The system evolves as a whole and not on the pieces and not on an individual level; although system upgrades occur from the individual level, with improved nodes giving a higher flow rate.

APPLICATION OF THE CONSTRUCTAL THEORY IN ECONOMY

We will continue the article by applying T.C. in economics and we will try to distinguish the mechanisms of the economy and especially of the economic crises through the scientific lens given by this theory. To do this we will start from the simplest elements of the economy and we believe that we will reach conclusions that are much closer to the principles of the Austrian School.

Let us consider the existence of one man. It is a potential hub of a future network, not yet materialized. In order to survive, man arranges and changes the environment around him; environment with which a mass and energy exchange takes place. He strives and extracts the necessities of life, in a self-sufficient existence. There are no exchanges with other people. It is a diffused movement of materials and energy.

We consider the emergence of the second person who is in the same situation as the first and is also a future potential node of a network. But the two nodes are not identical in terms of abilities. Nature has not created uniformity. Thus, between the two

nodes material exchanges occur. These are easy exchanges to supplement the existing ones. The movement of materials is still widespread.

The surface we consider for simplification is uniform. Thus, knots will appear on the entire surface approximately at equal distances. Each one needs an approximately equal surface to survive (plus minus depending on abilities). Exchanges occur between nearby nodes, but the flow is limited to neighborhoods. The flow channels are materials: goods, roads of property; and that is why they are limited in volume. The abilities of the nodes are different so that different products appear.

In order to be able to move a cargo from one point of the system to any other point with efficiency, two things are needed: easy change and safe travel. Thus, it appears as a necessity of accelerating flows: money and roads. The money must also be insured the roads so that some nodes become the nodes of money and roads insurance.

Thus the first flow system with vascularized configuration is created. Over this primitive system consisting of nodes representing individuals, another system will overlap (from clusters of individual nodes). These clusters can themselves be thought of as nodes depending on the reference system. Permanent human settlements appear, where the speed of the circuit is much higher due to the approach. Superimposed systems are formed in which, depending on the scale chosen for the study, the node acquires different dimensions and composition.

Thus the first flow system with vascularized configuration is created. Over this primitive system consisting of nodes representing individuals, another system will overlap (from clusters of individual nodes). These clusters can themselves be thought of as nodes depending on the reference system. Permanent human settlements appear, where the speed of the circuit is much higher due to the approach. Superimposed systems are formed in which, depending on the scale chosen for the study, the node acquires different dimensions and composition.

The first type of flow is diffused (between the environment and the human or between two individuals) then it is concentrated and the first channels appear that merge into larger channels. Institutions, banks (both of different degrees) can be considered channels. Like trees in a forest, they must cover the entire surface (necessities), that is, from many small to large ones with a certain rate of progress. An efficient system is one in which you can move an object or a sum of money through the whole system, if necessary and especially between any two points of the system.

Different abilities of people create different wealth even under identical natural conditions so that spontaneously wealth is distributed differently among people. But any change at the node level can change the flow as a whole. The role of the entrepreneurs is the innovation that can change the flow direction and the characteristics of the flow. But innovation can only occur spontaneously and locally, it cannot be finely anticipated and programmed. Any attempt to regulate innovation is ridiculous.

Banking system

The essence of the economic flow system consists of two flow channels: money and goods; these flow channels are bidirectional. Ideally, there should be equivalence between these channels. Unfortunately it is not, and the brake from one of the channels

has been removed, this brake represents gold as currency. So now that one of the channels goes without a brake, the flow of money is much faster than the flow of the commodity channel. Equivalence is established at times by crises.

The economic system has evolved so that it has improved its internal flow of money and goods. And the rule: the flow takes place from high concentrations to small ones, it anticipates a flow of capital from the areas where it is abundant to the areas where it is lacking. The condition is: there should be no barriers to the flow, and the surrounding areas should be allowed to connect to the system where the concentration of capital is high. The connection, without obstructionist interventions, is made freely.

The socialist systems only raised barriers over barriers to the normal flow of money and goods.

Through the flow of the economic system, two entities move in relation to each other and compared to each other. Money means information on one side and on the other side goods and services. The forces that oppose the flow of goods are greater than those that oppose the flow of money. That is why the flow of money can take different speeds from the flow of goods it represents. The only viable brakes in the circulation of money can be represented by banks, but they have shown that they can only accelerate the movement.

The speed and time of money flow between individuals is equal to the speed and time of the large channels formed by banks. And the banking system without interventions on it, would have a mathematical distribution between sizes and dimensions. Forced interventions on the banking system have made very few very large, few large, no middle and no small. This distribution is abnormal. Thus, there is no longer a ratio between the diffuse economy and the channel economy, and the system is completely destabilized. The central bank banking system created a totally wrong distribution of banks (size and number).

The banking system per its set up, no longer consists of intermediate flow systems each with its architecture, which could provide its flexibility. The various levels of flow have disappeared. Flow steps with adaptive designs have been replaced by rigid monolithic systems. They have a reduced ability to change their own architecture. Good hierarchies are those that are left free to form their own configuration and ensure stability. In the current banking system, the hierarchies are modified abnormally (by the imposition of the central bank and its rules) and the stability can no longer be ensured. These hierarchies appear spontaneously and cannot be anticipated. In order to anticipate the evolution of the banking system, the artificially imposed rules destroyed the system.

At the same time with the engines of the banking system, the brakes also had to evolve. But they were not only not allowed to evolve but were also removed by giving up the gold standard. Thus, the banking system has become more fragile over time.

The central bank banking system modified the previous system with spontaneously hierarchical vascularized architecture and modified it according to limited interests. The accelerations inside the channels by the uncontrolled extension of the credits and the falsification of the economic signals led only to the total separation of the financial channel from the one of the goods. There must be equivalence between these two channels, but somewhere this has been lost and must be permanently redone. As I said from the whole

mechanism, the brake represented by the connection with the gold was removed.

I will briefly describe the evolution of the banking system detached from gold, which is part of an evolution of type S according to T.C.

Consider a reference system in which the ordinate is the GDP, and the abscissa the years. The renunciation of gold created a new system of flow superimposed on the initial ones and with its own artificial architecture dictated by the rules of the central banks. Starting with 1914 (when we consider that the giving up of gold begins) a slow (but rising) growth of global production similar to the first part of S. We consider 1944 (the Bretton Woods agreement) a turning year and the ascent begins (at an accelerated rate) of world GDP similar to the upward (middle) portion of S. The growth rate in this phase is rapid. Starting with 1990 we believe that we are on the last part of the S with ascension (more and more decreasing as a rhythm), and 2020 with a miniscule rate of development.

As T.C. there are no hits from a wall but only takeovers of the evolution by a new flow system with a new architecture in which the flow is improved. This new flow system should have started its evolution around 2000 (a possible existence would be that of cryptocurrencies) and intersect (in its evolution) the curve of the current banking system around 2020. But we believe that this synchronization has not product and the last part of the current system curve will be a sharp drop.

Unfortunately, we see an evolution towards a brakes-less system, more uncontrollable. From an objective link of gold, there followed a system dependent on the character and knowledge of a group of people (central bank management) and now a system, in principle, without links (the cryptocurrency system); system that will have its own configuration and hierarchy.

Crises in essence are a bottleneck in the flow of banks. Blockage that comes from overloading the old system's drainage channels and damaging them. The stream will look for another route, new systems will be activated or little used parts of the old system will be activated.

During crises, the problem cannot be identified in the flow channels or the object of the flow, therefore the harmony will occur spontaneously and should not be intervened. Changes in flow occur at the individual level it is not possible to know which node will create a new flow path.

If the economy as a whole were left free then an economic stage (a system with an S-shaped evolution) would end slowly with a slow or stagnant growth. Its final curve would intersect with the upward portion of the curve that represents the new development stage. Manipulations and economic corruption make the end of the curve a sudden drop that stops when the new upward curve of the new flow system intersects.

Austrian school and construction theory

Both theories see as the essential element the basic components, in the case of the economy: the individual. Between individuals exchanges occur, ie flows will spontaneously lead to harmony, that is to say, the construction of social structures with a certain configuration and hierarchy. Any intervention on the system is harmful. The capital will inevitably move from areas with high concentration to those with low concentration. Differences of wealth are inevitable even in perfectly symmetrical built

systems. All obstacles in the way of circulation must be removed in order for systems to be able to be coupled and an attempt to standardize wealth.

An aspect that A.S drew attention to a long time ago is resumed by C.T.. Austrians speak of gold coin and bank deposits with 100% coverage; C.T. speaks of the need for brakes for a system so that it can evolve at higher flow rates. Within the current system: breaking the gold link, the sudden expansion of credit and the multiplication of money can only accelerate a system far beyond its possibilities and to separate it from reality.

It seems that the outlook is even worse: more brake-free systems are anticipated; systems totally devoid of contact with reality; more exposed to crises and unstable.

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COGNITIVE RE-ENGINEERING AND COLLABORATIVE INNOVATION AT THE CHIMIKEPP HOTEL IN HOKKAIDO (JAPAN)

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Abstract

A two-Michelin star boutique hotel located on the shores of the Chimikeppu Lake in Hokkaido (Japan), the Chimikepp Hotel has attracted international attention as a unique hospitality offering: a rare combination of a wild natural setting with rustic accommodation and French-inspired cuisine created on-site by one of Japan's most revered sous-chefs awarded two Michelin stars in 2019. Although the prestige of the facility is high, the on-site operations are handled by a small number of resident staff. This multi-skilled talent cross-work on various functions and provide seamless service at multiple points of client interaction.

This paper aims to monitor communication processes and methods, talent involvement, and atmosphere production, to illustrate the impact of collaborative technology, cultural symbols, and ontological design initiatives on guest perception and emotional behavior.

Keywords: Talent, Communications, Innovation, Cognitive, Science Engagement, Leadership, Management

JEL Classification: L83.

Introduction

Part of the Northern Arc Resort Group, the Chimikepp Hotel was established in 1998 in a secluded and pristine area on the shores of the Lake Chimikeppu, in an effort to provide visitors an opportunity to completely disconnect from the modern reality of urbanization. Although the developers paid meticulous attention to the wooden architecture of the building, the quality and choice of food and beverages,

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as well as the availability of outdoor activities, the business struggled to break even for sixteen continuous years. The unique location remote from major cities in Japan as well as the meager local infrastructure (the hotel was serviced by one single pebble road surrounding the Chimikeppu Lake) made the property highly inaccessible to buses and visitors expecting convenience and comfort.

Eager to amend the situation, The Northern Arc Resort Group executives tried a wide range of initiatives: tying up with larger tour operators, hiring a new general manager, training the incumbent talent pool to skill-up and to promote to new roles. Everything seemed to be of very little impact to the profit and loss statement in 2013.

Just as the owners were starting to consider either selling the Chimikepp property or closing the business, an international talent operator informed them of a third party's interest in the property. This inquiry was coming from a rather unique person – a chef of Japanese nationality who had never worked in Japan. Rather, ever since his graduation from the prestigious Musashi Cooking School of Goto Gakuen in Tokyo, he lived and worked in three different countries, honing his skills in service management and global hospitality practices on different continents. The inquirer was Chef Masaki Watanabe, a famous hospitality practitioner from the United States.

Both baffled and intrigued by the opportunity, the owners decided to travel to San Francisco in May 2014 to meet with Chef Watanabe and to discuss a business collaboration.

Chef Watanabe welcomed the visitors with his customary hospitality – highly charming, accommodating and thought provoking. He proposed to the visitors an elevated interpretation of "glamping" (the modern portmanteau of "glamourous" and "camping") for the Chimikepp Hotel, aiming to help guests disconnect from the necessity of being constantly connected, either for work or for other purposes, and to overcome digital fatigue by a total immersion in natural elements. To add character to the experience, Watanabe carried on presenting the importance of implementing ontological design practices at every touch point of the guest experience.

Chef Watanabe had started his career in hospitality in 2001 at Augerge de l'ile Barbe in Lyon (France), a gastronomic restaurant located in a prestigious 17th century building, classified as French National Treasure. After soaking in the art of French cuisine and European hospitality practices, Watanabe moved to the United States in 2006 to continue his career at The French Laundry, a prestigious restaurant of bucolic charm, where he worked side by side with world famous chefs, hospitality engineers and hoteliers. This is where Watanabe developed a keen interest in cognitive science, ontological design and hospitality production. He learned from his work colleagues that the ivy creeping up the stone façade of the auberge along with the tastefully decorated dining room contribute to

enhancing their guest experience beyond the art of the cuisine and regular hospitality practices. (Vlad, 2019).

Inspired by his colleagues to seek opportunities to charm and enchant visitors beyond expectations, Watanabe moved back to Europe in 2010 to pursue his career as a hospitality producer at the Beau-Rivage Palace Hotel, a historical luxury five-star hotel in Lausanne (Switzerland). Here he took his ontological design practices to a new level, exploring how various visual, olfactory, somatosensory and auditory stimuli impact the overall visitor experience. Watanabe was particularly impressed by the role played by nature in producing a memorable experience for the guests, especially the image of Lake Geneva, the French Alps and the silhouette of Evian Les Bains in the distance, as well as the forests surrounding the hotel. He realized that it was this total orchestration of natural elements, combined with the build environment and the hospitality practices of all the talent in house that created a unique and lingering impression with the guests, leading to repeated visits and, ultimately, to reputation (Vlad, 2019).[11]

Urged by an insuperable creative desire to practice deconstructing and reconstructing guest experiences, Watanabe joined the start-up team of hospitality producers as a Sous Chef at Benu, a restaurant located in San Francisco, in 2013. Here, he implemented all of his accumulated learning and on-the-site observations related to space production, customer experience creation, and cognitive practices in atmosphere development. He paid special attention to the reproduction of amazement, surprise and awe at every single touch point of service and guest interaction, from the moment of booking a dinner reservation to post-visits engagements, through both mail and digital platforms. One year later, Benu was awarded three stars from the Micheline Guide.

Called by his passion to continue creating memorable guest experiences and propelled by a personal sense of social responsibility to his homeland, Watanabe had searched for opportunities to take his hospitality career over to Japan, but nothing seemed to measure up to his expectations. International hotel chains, such as The Peninsula, The Mandarin Oriental, Shangri-La, Four Seasons, The Ritz Carlton and other brands had offered Master Chef roles with attractive compensation packages, as they were planning to open facilities in Tokyo and Osaka. However, Watanabe knew that his passion laid elsewhere. He wanted to be the total experience designer of a unique hospitality offering – something anchored in his global experience as a hotelier, his passion for cooking French inspired cuisine and his insights in atmosphere production, cognitive science and ontological design. When he heard of the Chimikepp Hotel, he felt that he finally found his calling.

[11] Vlad, Cristian (2019), *"Interview with Chef Masaki Watanabe"*.

The conversation with the Northern Arc Resort Group owners and senior executives went fast and Watanabe joined the Chimikepp Hotel as Sous Chef, CEO and Total Design Executive in January 2015.

Research Objective and Methodology

The main objective of this research is to illustrate the benefits for businesses to explore and develop cognitive science-based initiatives for engineering user emotions in the hospitality industry. In parallel, this research monitors the processes of internal and external communication implemented by the Chimikepp Hotel, as well as the talent engagement, organizational architecture and atmosphere production efforts of the business, showcasing the impact of cultural symbols, ontological design practices and collaborative technology on guest experience.

The methodological and conceptual-theoretical architecture of present research is built with central points focused on communication, talent management, and innovation in modern Japan. The focus is on illustrating the impact of collaborative technology, cultural symbols, and ontological design initiatives on guest perception and emotional behavior.

The authors of this research engaged in first-hand participatory observation of the ontological design initiative development efforts and the change management process in order to observe various stages of organizational development, business transformation, and cultural integration. The present analysis was conducted based on an actual business case study. The authors of this paper worked along with Watanabe's team of hospitality professionals to determine existing pain points and to develop recommendations for business transformation.

The Culture Development Process

As soon as he started his role as Sous Chef, CEO and Total Design Executive in January 2015, Watanabe set out to re-engineer the total user experience of the Chimikepp Hotel's stakeholders. He knew from his experience in hospitality management that an ultimate customer experience can only be created along with an ultimate employee experience, so he set off to revamp incumbent talent operations, communications initiatives and technology utilization. Concurrently, Chef Watanabe set off to analyze the impact the natural setup the build environment had on users (both customers and employees).

As an early observation, Watanabe acknowledged that time had its own rhythm on the shores of the Chimikepp Lake. The serenity of the mountains, the fresh air of the forest and the tranquility of the lake were all conducive to introspection and relaxation. Occupancy was fluctuating not only between seasons (summer being considered "high season", while winter was "low season"), but also between the days of the week (weekends being considered "prime time", with an average of 88% occupancy in summer and 38% in winter, while weekdays

could have as low as 35% occupancy in summer and 5% occupancy in winter). The reservations staff considered this to be "business as usual", as, according to their knowledge, it had always been that way, and other neighboring facilities were also experiencing heavy fluctuation. Therefore, it was commonly seen as a phenomenon which could not be helped.

In an increasingly volatile, uncertain, complex, and ambiguous world (the so-called VUCA world) – a world of new challenges and opportunities – organizations naturally need to expect *more*, and not *less*, of themselves and the people who work for them. But our familiar organizational design fails to match that need (Kegan; Lahey, 2016).

The results of a customer engagement survey conducted in January 2015 indicated that 93% of the customers were visiting from within the region (the island of Hokkaido), 28% were repeaters and 64% did not know much about the facility before arrival. 58% or the customers expressed that, although the natural setup was impressive, they would not consider spending longer that one night, while 34% indicated that they might not be coming back.

A similar employee engagement survey conducted at the same time indicated that 31% of the employee population was hopeful of the future of the business, 23% of the employee population had a specific career plan, while only 16% of the employees indicated that they would be interested to relocate in search of a different opportunity or a new career challenge in the future. 32% of the employees surveyed indicated that they trusted their management, 18% mentioned that they felt that their management was taking their personal aspirations into account, 26% indicated that they ever had a career discussion with their manager, while only 18% mentioned that they ever experienced any kind of recognition from the management or the organization.

Discussions and Actions

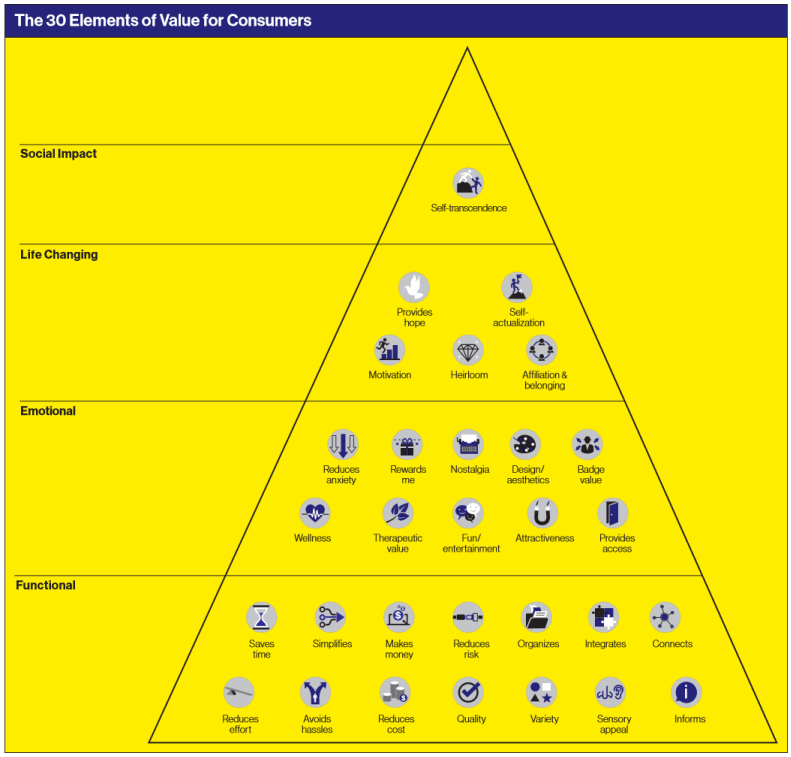
It should be emphasized that Chef Watanabe took the results of the engagement survey into serious consideration. He knew that there was a lot of work to be done. He realized that innovation had to take place in a series of circumstances related to people's operations, user engagement, and communications. A fervent believer in the impact culture, atmosphere, and the built environment have on user engagement, Watanabe started looking at a combination of initiatives to impact user behavior and to upscale the total experience of employees and customers alike.

Such as many other aspects of social science, interpersonal communication is a subject close to the common perception, due to the notoriety of this human interaction phenomenon (Dărăbăneanu, 2019:24), Chef Watanabe realized that, as a first step, he had to work with the mindset of his co-workers in order to impact behavior and redefine the culture of the organization. In an effort to determine

how to best advocate innovation and collaboration across the organization, Watanabe decided to explore the intrinsic motivators of his team members and to identify cultural symbols and elements of value specific to his employee population, collaborators, suppliers, and visitors to the property.

While seeking to determine motivational factors, Chef Watanabe knew that there was an important factor of the Japanese culture that he also needed to take into consideration. The fact that casual recognition is not commonly encountered in corporate Japan combined with the reality that workers are not used to being praised regularly had also to be considered. Recognition is not a commonly encountered phenomenon in Japanese services; good quality of work and service is simply expected, without specific incentives or rewards being attached to performance. To Chef Watanabe, this was clearly a major difference from his past experience in Europe and the United States and he knew that he had to engineer the whole concept of recognition into the development of the new culture at Chimikepp.

After a series of discussions with the business consultants and the group of executive directors, Watanabe decided to begin the transformation process by creating psychological safety within the organization and by taking a holistic approach to redefining culture, based on shared values and cultural symbols.



"The Elements of Value", Almquist

Products and services deliver fundamental elements of value that address four kinds of needs: functional, emotional, life-changing, and social impact (Almquist et all, 2016).

"I've learnt that people will forget what you said, people will forget what you did, but people will never forget how you made them feel" (Maya Angelou). Inspired and impressed by this powerful quote, Watanabe decided to focus on the core emotional elements of value: nostalgia, wellness, attractiveness, fun, entertainment, design, aesthetics and therapeutic value. After a series of discussions with the team, he further decided to focus on five cultural symbols characteristic of Japan and, moreover, the northern island of Hokkaido: "translucence" *sukashi* 透かし, "transience" *wabi* 詫び, "imperfection" *sabi* 寂び, "silence" *seijaku* 静寂 and "purity" *seiren* 清廉. The team worked together to develop a new set of *Mission, Vision and Values* based on these symbols. These symbols were later embodied in the production of the interior design and the atmosphere of all public spaces.

As a second talent and organizational initiative, Watanabe explored the opportunity of providing his homogeneous team of Japanese hospitality professional with inspiration by hiring two Japanese speaking international interns into the team. The multilingual interns join the Chimikepp Hotel team in February 2020, proposing a series of new initiatives, such as promoting the hotel in languages other than Japanese in the digital space and reaching out to new potential guests overseas. Watanabe knew that the new ideas would create not just enthusiasm, but also concern within the team.

Therefore, he made time for learning sessions throughout the working week, so that the team could spend time together and learn from each other intentionally. Chef Watanabe observed that learning was an efficient way of including and celebrating diversity within the team. Moving forward, the continued the talent transformation efforts by creating structures and emotional engineering opportunities for associates to observe and intentionally learn from diversity, by connecting and combining ideas, reframing problems and by moving beyond the first line of right answers in an agile manner.

Concurrently, Watanabe knew that recreating the guest experience beyond general service was going to be an important step in re-defining and re-engineering the customer value proposition. From his experience in France, Switzerland and the United States, he knew that both the natural and the built environment had to be taking into serious consideration for creating a unique form of spectatorship, which would lead to an awe-inspiring guest experience. Watanabe was keen to create both an immersive and an interactive form of spectatorship at the Chimikepp hotel, a combination of experiences leading to breathtaking moments of surprise, providing stimulus to the intellectual curiosity and offering multiple and continuous opportunities of discovery.

When analyzing the natural setting and the built environment at Chimikepp and observing how the later blends into the former, it would be remiss not observe the impact their unique combination has on the subconsciousness of the visitor. The wooden lodge set on the quiet shores of the Chimikepp lake provides not just temporary shelter, but also a subtle invitation to unwind and to forget, at least for a while, about everything that happens beyond the surrounding mountains, the forest and the lake.

The natural setting provides a psychological disconnect, while the built environment, composed of a cozy fireplace, dim light chandeliers resting on a high triangular ceiling of wood, invites the subconsciousness to recognize familiar symbols of warmth, safety and confront. After a whole day of exploration, exercise and wonderment spent outdoors, the Chimikepp Hotel guests find evening rest either by the fireplace or by the bar, in anticipation of the two Michelin star dinner – another element of awe and surprise.

The total orchestration of wonderment and awe leads to the creation of repeated moments of pleasant surprise – a *sui generis* combination of experiences which, in their own turn, lead to a perplexing, alluring and lingering value proposition for the Chimikepp guests. The result is what Alison Griffits calls "the revered gaze" – a response marked as much by recognition of the labor and effort involved in creating the spectacle as in the spectacle itself (Griffits, 2013). Watanabe believed that modern hospitality consisted of a skillful mix of entertainment, education, accommodation, food and beverage, communications, cognitive science, psychology, technology and talent operations. Modern guests will not come back unless they have been awed, unless their actual experience of hospitality far exceeds their initial expectation. Charming guests throughout repeated visits becomes a matter of combined professional skills, grit, cognitive science expertise, hospitality competencies and commitment (Watanabe, 2019).

As part of the employee experience transformation initiative, Watanabe introduced regular recognition sessions, where employees where invited to share best practice episodes, to indicate specific moments when they observed one of their colleagues perform at their best, to talk about situations when one of their colleagues provide outstanding service and to point to concrete learning points and takeaways from their observations. Along with these weekly recognition sessions, a "thank you" point system was introduced as part of a new employee communication application which all employees would carry on their mobile devices. The employees could easily send a simple "thank you" message to other employees who helped them learn something new or helped them out in a difficult situation.

An employee and customer engagement survey conducted in April 2020 showed early indicators of meaningful change: 66% of the employee population was hopeful of the future of the business, 38% of the employee population had a specific career plan, 23% of the employees indicated that they would be interested

to pursue a higher opportunity or a new career challenge, regardless of location, in the future. Furthermore, 85% of the employees surveyed indicated that they trusted their management, 46% mentioned that they felt that their management was taking their personal aspirations into account, 89% indicated that they ever had a career discussion with their manager, while 93% mentioned that they experienced recognition from the management or from the organization. The customer survey indicated that only 62% of the customers were visiting from within the region (the island of Hokkaido), while 31% were coming from other parts of the country and 7% were visiting from overseas. 32% were repeaters and 65% knew about the facility before arrival. 63% or the customers were spending longer that one night, and 76% indicated that they would be coming back within a year.

By May 2020, Watanabe could finally go back to the kitchen and spend time doing what he loved most: cooking and constantly innovating with various ingredients, spices and wines. He was pleased to see engagement indicators moving higher, but he knew that there was still a lot of work to be done.

Conclusion

There are many methods of implementing collaborative innovation in organizations and recreating organizational architecture. There are differences according with the socio-cultural objectives of the organization, the incumbent architecture, existing and emerging cultural symbols, ontological design practices, and the utilization of collaborative technology. At Chimikepp Hotel in Hokkaido (Japan), communications, engagement and talent innovation played a crucial role in developing and deploying organizational culture, cultural value penetration, and cognitive re-engineering.

The use of technology in building teams and enhancing communications provided opportunities for optimized innovation, developing clear roadmaps, and creating a sustainable corporate architecture for moving from inspiration to implementation, talent engagement. Furthermore, the built environment and work atmosphere production influenced organizational behavior, redefined the culture of the organization, and significantly improved the experience of employees and customers. Moreover, analyzing combination of natural setting and built environment at Chimikepp in the context of cognitive re-engineering and collaborative innovation, we observed the positive impact of this holistic approach to cultural redefinition, based on shared values and cultural symbols.

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ICT USAGE PATTERN AND PERCEPTION AMONG STUDENTS WITHIN BANGLADESH

Ruhul Amin, Md. Imran Sheikh and Md. Hossain Ali[12]

Abstract

ICT has appeared to play a crucial role in the enhancement of skills of pupils in academia, which is seen in the tertiary level education at its most. The present study aims at examining the perception and usage of ICT instruments, such as computer, smart-phone, and internet services and accessories for personal and educational purposes among the university students in Bangladesh. A sample of 300 students of undergraduate and graduate programs from 7 universities was constructed through 'Snow-Ball' technique. Questionnaire survey, following the personal interview method, was conducted to generate benchmark data. Survey data were analyzed through applying descriptive and inferential statistics. The outcomes of the study elicited that majority percentage of the students of the selected universities of Bangladesh use ICT for mostly personal and partly educational purposes though it is their belief that ICT instruments improve their academic capability, problem solving ability, and communication skills. Furthermore, correlation analyses showed that age, level of education, and place of residence have positive and significant level of association with most of the areas of ICT usage patterns. However, notable gender differences were not found in ICT usage pattern. Potential implications of these results are discussed in later section.

Keywords: Students, ICT, Usage Pattern, Perception, and Bangladesh

JEL Classification: L63, L86, C42

1. Introduction

The instruments, which are effectively used to create, collect, organize, process, and present data and information regardless of location and distance, are known as Information and Communication Technology (ICT) (Gay & Blades 2005; Dunmill & Arslanagic 2006; Blurton 1999). In line with this definition, it can be said that information technologies consist of all devices that assist us reach, process, and use knowledge (Sari 2014). However, ICT has already touched many aspects and changed the ways of our life (Schindler et al. 2017; Hossain & Haque 2013) through introducing abstract concepts (e.g., images, sounds, movement, animations, and simulations) to our life (Clark 1983; 1994). Particularly, it has become an undivided part of education and its

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impact on teaching, learning, and academic management is extensively accepted (Mahmood 2009; Jager & Lokman 1999) because ICT tool, particularly internet provides the members of academia (e.g., faculties, students, researchers) with a widespread access to both traditional and non-traditional sources of information (Mostofa 2011). In this way, the use of ICT devices ameliorates innovation, learning process, motivation, and academic success of students (Mir & Shakeel 2019; Sangrà & González-Sanmamed 2010; Sari 2014). ICT, therefore, is expected to enhance students' skills for cooperation, communication, problem solving, and lifelong learning in order to create future leaders (Plomp et al. 1996; Voogt 2004) through changing them into productive knowledge workers (Pelgrum et al. 1993). In light of the above discussed positive academic outcomes of ICT, it is expected from the students to develop ICT literacy skills (Gerick, Eickelmann and Bos 2017) because ICT has directly changed the nature of teaching and learning to the very extent cogitable (Kozma 1991; Dede 1996).

So, taking into considering the positive effects of ICT equipment, its usage rates are growing very fast in the European Union (Youssef & Dahmani 2008). Consistently, the Government of Bangladesh (GoB) is also engaging the academia in its pursuit of 'Digital Bangladesh.' The educational institutions, especially universities are making commendable contributions in the development of ICT in Bangladesh through increasingly using it in academic as well as administrative activities that acted as a catalyst for the use of ICT by the students as well (Miyan 2009; Bairagi *et* al. 2011; Huda *et* al. 2009). Thus, the universities in Bangladesh have become the pioneers in adopting and using ICT tools and techniques (Roknuzzaman 2006). As a result of these initiatives undertaken by the Government of Bangladesh, higher percentage of school and college going students of Bangladesh own and use different ICT devices (e.g., desktop, laptop, cellphone, iPOD, MP3 player) (Khalid 2011). However, research on actual ICT usage patterns among students, particularly university students is scarce in Bangladesh.

Therefore, the present study aims at assessing the perception and usage of ICT among selected university students of Bangladesh. This study differs from previous works performed in the context of Bangladesh in three ways. Firstly, it focuses on generating information as to the actual usage patterns of ICT among university students for their personal and educational activities. Secondly, it investigates the relationship of individual contributory factors (e.g., age, gender, type of residence, and educational background) with ICT usage pattern among students. Thirdly, it assesses the perception of ICT among the students in terms of the perceived advantages and scope of ICT as a resource in their personal and educational activities.

The rest of this paper is structured as follows. Section 2 reviews the existing past studies on ICT usage pattern and its perceived positive impact on students' academic life, whereas Section 3 is concerned with the methodology employed in this study. Data analyses and results are delineated in Section 4, while Section 5 enumerates discussion on major findings and their implications for practice. Section 6 points out some limitations and accordingly, provides directions for future research and finally, Section 7 draws conclusion.

2. Literature Review

2.1. Pattern of ICT Usage among Students

Mostofa (2011) conducted a study on ICT usage pattern among business students at Darul Ihsan University of Bangladesh and came up with the findings that 35 percent of the students use internet daily, 32 percent twice or three times a week, 10.9 percent twice or three times a month, 4.4 percent once in a month, 10.2 percent occasionally, and 7.5 percent rarely. This study also showed that 56.2 percent of the students use ICT devices (e.g., internet) for educational purposes. Consistently, a subsequent study by Senthil (2018) pointed out that lots of students use ICT instruments (e.g., internet and others) for academic purposes (e.g., to access their text books, reference books, and read daily newspapers) and to access the internet, most of the students use smart-phone (Apuke & Iyendo 2018; Senthil 2018).

A recent study on the impact of ICT on the academic performance of medical students within India revealed that most of the students had smart-phones and used ICT up to 3 hours a day. This study also depicted that 13.33 percent of the students use ICT tools (e.g., phone and laptop) for educational purposes, 9.33 percent for non-educational purposes, and 77.33 percent for both purposes (Mir & Shakeel 2019). So, keeping in view the above discussed research we can summarize that ICT diffusion level is increasing among the students around the world and they are using these ICT devices for both personal and educational purposes.

2.2. Perceived Impact of ICT on Students' Academic Life

Sari (2014) conducted a study on the influences of ICT usage patterns on learning process among the students of the department of computer and instructional teaching technologies of the American University and found that ICT-based education motivates the students and latterly, this motivation improves their academic performance. Furthermore, ICT devices improve the level of communication and interaction among the students, which was found from the subsequent work operated by Zweekhorst and Maas (2015). In line with these findings, Apuke & Iyendo (2018) depicted that students can use ICT tools and techniques (e.g., internet) for performing different academic related activities (e.g., conducting research, doing multiple homework, broadening the scope of learning, and uplifting peer learning, and examination preparation).

A recent study conducted by Senthil (2018) revealed that students' academic performance is influenced by their internet usage pattern. The relationship between ICT usage pattern (e.g., internet) and academic performance among students was empirically tested by some other researchers. For example, a very recent study by Mir & Shakeel (2019) found that possession of ICT devices (e.g., smart-phone and laptop) is negatively associated with students' academic performance. Moreover, time spent on ICT tools has moderate level of negative correlation with academic performance of the students. However, gender has significant level of positive correlation with academic performance. An earlier study in 2000 on gender differences in internet use patterns among introductory psychology students at Texas Tech University appeared with the finding that gender differences were found in ICT usage pattern. Specifically, females use ICT (e.g., internet) for communication and academic purposes, whereas, their male counterparts use ICT for amusement purposes (Weiser 2000).

2.3. Contribution to Knowledge

This literature review determines a gap in the study of ICT usage pattern and perception among university students of South Asian countries and particularly, Bangladesh. In the past, notable studies on the ICT usage pattern and its effects on the students' life were operated in USA (Sari 2014; Weiser 2000) and in India (Mir & Shakeel 2019). Henceforth, study on the ICT usage pattern among students is interesting in the context of Bangladesh. Considering this, a researcher (e.g., Mostofa 2011) conducted a study on ICT usage pattern among the university students of Bangladesh in narrow scale. Our study contributes to the existing literature review with the inclusion of comparatively more universities of Bangladesh. Moreover, the results of the correlation analyses of the study will help other researchers opt in significant variables when they conduct similar studies. This study is important because to the best of our knowledge, it is one of the few studies on the ICT usage pattern and its association with the individual contributory factors (e.g., age, gender, educational qualification, and place of residence) among students in the context of universities operating in Bangladesh.

3. Methodology

The research design adopted for this study is descriptive in nature; such designs are suitable for the cross-sectional type of study of a large variety (Kotahri 2006). However, we employed qualitative and quantitative data to generate the outcomes of present study. Secondary sources (i.e., journals, reports, conference proceedings, and books) were discussed to delineate the framework of the study. The benchmark primary data of the study was generated through survey using a respondent administered questionnaire. A sample of 300 university students from different public and private universities in Bangladesh was created following the 'Snow-Balling' approach for this purpose. Undergraduate and graduate level students from 5 public universities namely, University of Dhaka (DU), Bangabandhu Sheikh Mujibur Rahman Science and Technology University (BSMRSTU), Khulna University (KU), Jagannath University (JNU), and Jahangirnagar University (JU), and 2 private universities namely, Northern University (NU), and North South University (NSU) were included in the sample. The variables included in the study are age, gender, place of residence, level of education, and ICT usage patterns (i.e., time spent on computer and smart-phone, time spent on internet, type of internet connection used, purposes of the use of ICT, and per month expenditure for ICT facilities). The survey data were analyzed through the use of computer programs. Among the different analysis tools, descriptive statistics and correlation analysis were significant.

4. Projection of Data and Analyses

Table 1 below explains the characteristics of the sample elements. These sample elements were characterized by their age, gender, place of residence, and educational qualification. Among 300 respondents, the age group of 57% was ranged from 18 to 22 years and 43% from 23 to 27 years. The survey included 67.7% male and 32.3% female students. Of the respondents, 40% lived in sub-urban areas and 60% in urban areas. There were 208 under-graduate (69.3%) and 92 graduate students (30.7%).

Table no. 1 Characteristics of the study population, (n=300)

Particulars	Frequency	Percentage
Age		
18-22 years	171	57.0
23-27 years	129	43.0
Total	300	100.0
Gender		
Male	203	67.7
Female	97	32.3
Total	300	100.0
Place of residence		
Sub-Urban	120	40.0
Urban	180	60.0
Total	300	100.0
Level of education		
Undergraduate	208	69.3
Graduate	92	30.7
Total	300	100.0

Table 2 below shows the respondents' ICT usage patterns in terms of time spent on computer and smart-phone, time spent on internet, types of internet connection used, ICT usage purpose, and monthly internet expenses. Computer, laptop, and cell phones are one of the most important tools of ICT. Our study reveals that 59.7% of total respondents use computer and smart-phone up to 5 hours daily, 31.7% from 6 to 10 hours and only 8.7% use computer and smart-phone for more than 10 hours a day. Internet is another active service of ICT. Table 2 demonstrates that 79% use internet up to 5 hours a day and 21% for more than 5 hours daily. However, a student may use various modes to access internet (e.g., cell phone network, dial-up modem, Wi-Fi, and broad band connection). As the study shows that 36.3% of total respondents use cell phone networks for internet connection, 9% use dial-up modems, 9.3% use Wi-Fi networks, 4.3% use broadband cable connections, 8.3% use both cell phone networks and Wi-Fi networks, 10.7% use both cell phone networks and dial-up modems, 12.3% use both cell phone networks and broadband cable connections, only 4% respondents use all of the aforesaid modes for internet connection, and only 5.7% do not have any internet connection.

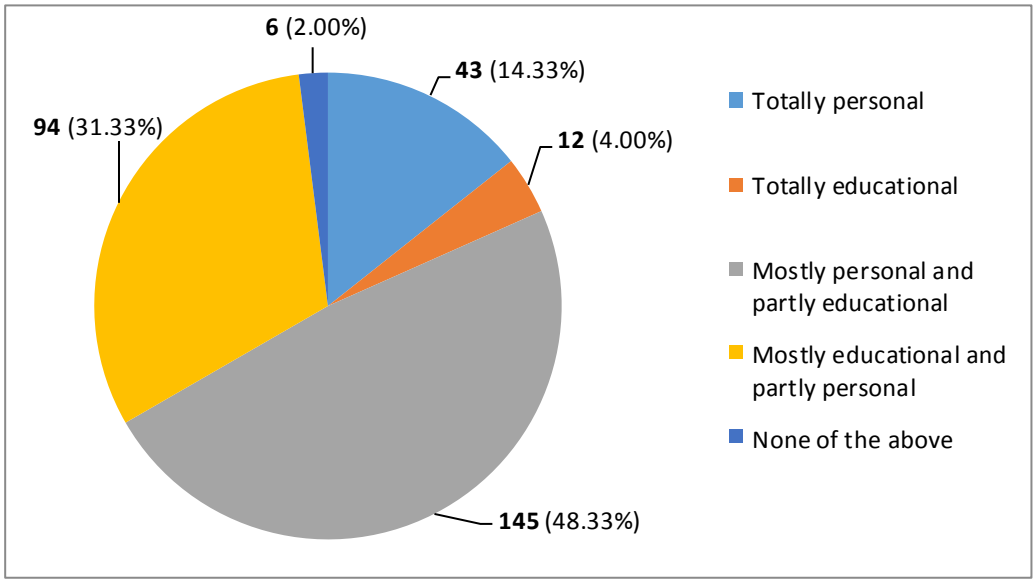
Table no. 2 ICT usage pattern among students in Bangladesh, (n=300)

Particulars	Frequency	Percentage
Time spent on computer and smart-phone in a day:		
Less than or equal to 5 hours	179	59.7
6-10 hours	95	31.7
More than 10 hours	26	8.7
Total	300	100.0
Time spent on internet in a day		
Less than or equal to 5 hours	237	79.0
More than 5 hours	63	21.0
Total	300	100.0
Type(s) of internet connection used:		
Only cell phone network	109	36.3
Only dial-up modem	27	9.0
Only Wi-Fi	28	9.3
Only broad band connection	13	4.3
All of the above	12	4.0
Cell phone network and Wi-Fi	25	8.3
Particulars	**Frequency**	**Percentage**
Cell phone network and dial-up modem	32	10.7
Cell phone network and broad band connection	37	12.3
None of the above	17	5.7
Total	300	100.0
Purpose of the use of ICT:		
Totally personal	43	14.3
Totally educational	12	4.0
Mostly personal and partly educational	145	48.3
Mostly educational and partly personal	94	31.3
None of the above	6	2.0
Total	300	100.0
Per month expenditure (in BDT) for internet usage:		
Less than or equal to 500 tk.	252	84.0
501-1000 tk.	46	15.3
More than 1000 tk.	2	.7
Total	300	100.0

Source: *Field Study*

University students use aforementioned ICT tools for different purposes. Among 300 students, 14.3% use ICT for totally personal purpose; only 4% for totally educational purpose; 48.3% use ICT for mostly personal and partly educational purpose; 31.3% for mostly educational and partly personal purpose and only 2% respondents do not use any ICT tools and techniques for any purpose. The expenditure for internet use varies from person to person. The results of the survey demonstrate that 84% of the respondents spend up to BDT 500 per month for internet use, 15.3% from BDT 501 to 1000, and only .7% spend more than BDT 1000 per month for internet use. The purpose of the use of ICT by the university students is graphically presented in the figure 1 below:

Figure no. 1 Purposes of the usage (value, percentage) of ICT, (n = 300)



From the table 3 below, it is found that respondents' age has significant level of positive correlation with their ICT usage patterns (i.e., time spent on computer and smart-phone in a day, time spent on internet in a day, and expenditure for internet use), whereas, age has no direct relationship with the types of internet connection used and purpose of use of ICT devices. These results signify that students from selected universities in Bangladesh with different age groups use ICT in different ways, specifically in terms of time spent on ICT tools (i.e., computer, smart-phone, and internet) and monthly expenditure for using internet.

Table no. 3 Correlation between age and ICT usage pattern, (n=300)

	Particulars	**Time spent on computer and smart-phone in a day**	**Time spent on internet in a day**	**Types of internet connection used**	**Purpose of the use of computer, smart-phone, and internet**	**Per month expenditure for internet use in BDT**
Age (18-22 or 23-27 years)	Pearson correlation	.170**	.142*	-.060	-.109	.160**
	Sig. (2 tailed)	.003	.014	.299	.060	.006
	Sum of squares and cross- products	366.100	212.140	-113.120	-64.320	24969.720
	Covariance	1.224	.709	-.378	-.215	83.511
	n	300	300	300	300	300

** indicates that correlation is significant at 1%
* indicates that correlation is significant at 5%

The table no. 4 below reveals that gender has significant negative correlation (-.128, i.e., -12.8% only) with time spent on computer and smart-phone in a day, and non-significant negative correlation with time spent on internet in a day, types of internet connection used, purpose of use of ICT devices, and per month internet expenditure. So, in light of the aforesaid results, it can be summed up that remarkable gender differences were not found in ICT usage patterns among the respondents.

Table no. 4 Correlation between gender and ICT usage pattern, (n=300)

	Particulars	**Time spent on computer and smart-phone in a day**	**Time spent on internet in a day**	**Types of internet connection used**	**Purpose of the use of computer, smart-phone, and internet**	**Per month expenditure for internet use in BDT**
Gender (Male or Female)	Pearson correlation	-.128*	-.071	-.081	-.011	-.098
	Sig. (2 tailed)	.026	.220	.163	.846	.089
	Sum of squares and cross-products	-65.608	-25.327	-36.137	-1.587	-3647.847
	Covariance	-.219	-.085	-.121	-.005	-12.200
	n	300	300	300	300	300

** indicates that correlation is significant at 1%

* indicates that correlation is significant at 5%

The outcomes of table 5 below demonstrate that respondents' place of residence is significantly and positively associated with their ICT usage patterns (i.e., time spent on computer and smart-phone in a day, time spent on internet in a day, types of internet connection, and per month internet expenditure). On the other hand, place of residence is negatively correlated with the purpose of use of ICT. In line with the above results, it is evident that students, living in sub-urban or urban areas, use ICT in different ways except in terms of the purpose of the use of ICT equipment.

Table no. 5 Correlation between place of residence and ICT usage pattern, (n=300)

	Particulars	Time spent on computer and smart-phone in a day	Time spent on internet in a day	Types of internet connection used	Purpose of the use of computer, smart-phone, and internet	Per month expenditure for internet use in BDT
Place of residence (Sub-Urban or Urban)	Pearson correlation	.128*	.187**	.150**	-.026	.299**
	Sig. (2 tailed)	.027	.001	.009	.657	.000
	Sum of squares and cross-products	68.500	69.600	70.200	-3.800	11607.800
	Covariance	.229	.233	.235	-.013	38.822
	n	300	300	300	300	300

** indicates that correlation is significant at 1%
* indicates that correlation is significant at 5%

The table 6 below comes up with the findings that level of education of the respondents has significant level of positive relationship with their ICT usage patterns (i.e., time spent on computer and smart-phone in a day, time spent on internet in a day, and monthly expenditure for internet use), while, it has non-significant level of negative correlation with the types of internet connection and purpose of the use of ICT devices. Consistent with the above mentioned results, it can be finalized that graduate and under-graduate students use ICT in different ways in terms of time spent on computer, smart-phone, and internet and monthly internet expenses.

Table no. 6 Correlation between level of education and ICT usage pattern, (n=300)

	Particulars	Time spent on computer and smart-phone in a day	Time spent on internet in a day	Types of internet connection used	Purpose of the use of computer, smart-phone, and internet	Per month expenditure for internet use in BDT
Level of education (Under Graduate or Graduate)	Pearson correlation	.308**	.296**	-.098	-.003	.158**
	Sig. (2 tailed)	.000	.000	.090	.955	.006
	Sum of squares and cross-products	155.433	103.907	-43.253	-.453	5779.187
	Covariance	.520	.348	-.145	-.002	19.328
	n	300	300	300	300	300

** indicates that correlation is significant at 1%
* indicates that correlation is significant at 5%

From the table 7 below, it is found that 46.3% of the respondents 'Strongly Agree' and 43% of the same 'Agree' that they freely spend money to avail ICT services, which constitutes nearly 90% of the total. This result implies that most of the students find ICT as an integral component of their academic and personal life.

Table no. 7 Perception about ICT among university students of Bangladesh, (n=300)

Particulars	Strongly agree N (%)	Agree N (%)	No Comment N (%)	Disagree N (%)	Strongly disagree N (%)
I willingly spend money to avail ICT facilities	139 (46.3)	129 (43.0)	18 (6.0)	11 (3.7)	3 (1.0)
The use of ICT enhances my academic skills and capabilities	144 (48.0)	133 (44.3)	21 (7.0)	2 (.7)	0 (0)
The use of ICT enhances my capability to solve the academic and personal problems	114 (38.0)	149 (49.7)	33 (11.0)	3 (1.0)	1 (.3)
The use of ICT enhances my skills and capabilities of communication	127 (42.3)	118 (39.3)	44 (14.7)	8(2.7)	3 (1.0)
The use of ICT provides access to sufficient information to fulfill my purposes	99 (33.0)	134 (44.7)	55 (18.3)	10 (3.3)	2 (0.7)
I prefer to use soft copies of documents over hard copies for their ICT compatibility	46 (15.3)	77 (25.7)	68 (22.7)	86 (28.7)	23 (7.7)
I believe that the use of ICT positively affects my academic and personal life	154 (51.3)	118 (39.3)	22 (7.3)	3 (1.0)	3 (1.0)

Source: *Field Study*

More than 92% of the respondents are in agreement (i.e., 48% and 44.3% respondents 'Strongly Agree' and 'Agree' respectively) that the use of ICT improves their educational skills and capabilities. Furthermore, nearly 88% of the respondents are in agreement (i.e., 38% and 49.7% respondents 'Strongly Agree' and 'Agree' respectively) that the use of ICT enhances their problem solving skills. ICT tools also improve the level of communication among the students (Zweekhorst and Maas 2015). Our study supports this by viewing that nearly 82% of the respondents conform that ICT usage augments their communication skills. In addition to the aforementioned positive outcomes, ICT (e.g., internet) also provides the members of academia with an extensive access to both conventional and non-conventional sources of information (Mostofa 2011). In line with this, our study puts up that more than 77% of the respondents concur that the use of ICT provides them access to enough information to accomplish their purposes (i.e., both academic and personal).

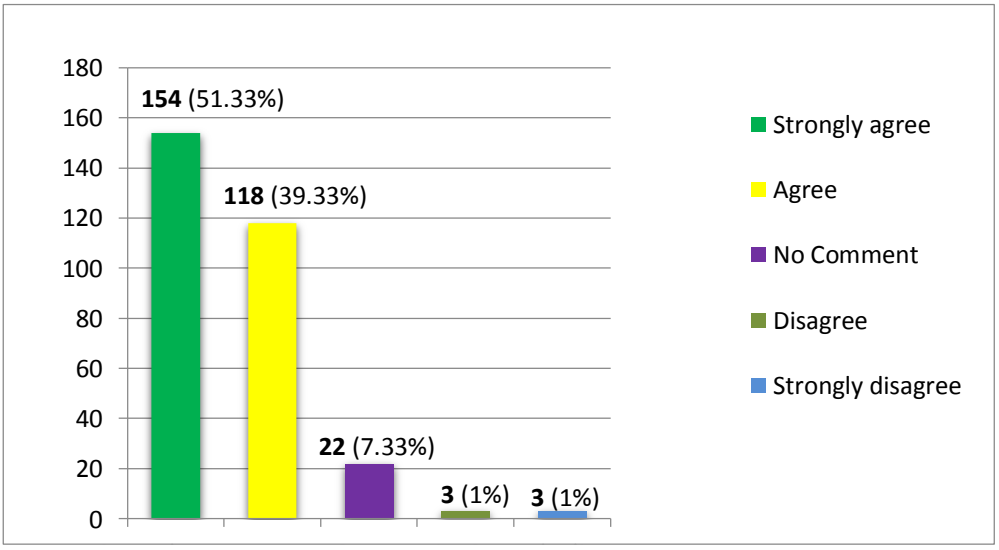
However, only 41% of the respondents agree that they prefer to use soft copies over hard copies of documents (e.g., books, articles etc.) for their ICT compatibility. Finally, more than 91% of the respondents agree on the positive effects of ICT equipment

on their both academic and personal life. The perception of the students towards the positivity of ICT is graphically presented in the figure 2 below:

5. Discussion and Implications for Practice

It is evident from the literature that ICT usage has incorporated various positive outcomes into our life, especially students' personal and educational life. Hence, it is the prime responsibility of the sovereign authority to ensure availability of ICT facilities across the country and afterwards, teachers, parents, and other helping hands should motivate the students to get engaged in rational and controlled ICT usage pattern. Taking the aforesaid imperative effects of ICT into consideration, the present study comes up with the actual usage pattern of ICT and its perception among university students in Bangladesh. Findings of this study have put forth some suggestions for the concerned stakeholders (i.e., government, ICT policy makers, teachers, guardians, and others concerned).

Figure no. 2 Perception about the positivity of the effects of ICT on academic and personal life (value, percentage), (n = 300)



First, an important finding of this study is that majority percentage of the selected university students of Bangladesh use computer, smart-phone, and internet on daily basis and they willingly spend money to use ICT. This scenario implies that ICT engagement level is increasing among the university students of Bangladesh. However, they believe that ICT usage improves their academic performance but most of them are using these instruments for personal and non-educational purposes. So, their actual usage pattern is not aligned with their perception. In regard to this, our study expects the influential stakeholders (e.g., teachers, parents, friends, government, NGOs) to extend their hands in order to create awareness among the students as to the positive outcomes of ICT usage in

academic fields and the negative results derived from the uncontrolled use of ICT devices as well (Mir & Shakeel 2019).

Second, positive and significant relationship between students' living place and ICT usage pattern was found in our study. This signifies that urban students' ICT engagement level is more than that of students living in sub-urban and rural areas. Henceforth, our study urges the Government of Bangladesh and private organizations to take steps in order to enhance ICT infrastructural facilities and expand internet services in rural and sub-urban areas as well because failure to do so will take notable portion of Bangladeshi population (i.e., rural and sub-urban) away from the blessings of ICT. However, our study did not find any citable direct and significant level of gender differences in ICT usage pattern among students. This finding is inconsistent with that of study operated by Weiser (2000).

Finally, looking into the students' perception about the positivity of ICT, our study appears with the result that ICT tools improve students' academic skills, problem-solving ability, and communication skills, which were perceived by most of the respondents of this study. This finding is also supported by previous research (e.g., Sari 2014; Zweekhorst & Maas 2015; Plomp *et* al. 1996; Voogt 2004). In this regard, students themselves should sketch a map in order to bring alignment between their perception and behavioural pattern about ICT.

6. Limitations and Directions for Future Research

Limitations do exist in all research. So, it would not be appropriate to state that our findings are applicable to all universities operating in Bangladesh. The limitations associated with this study are mentioned here. First, the sample volume of this study is not adequate to generalize the results. This study surveyed only 300 university students with the inclusion of only seven universities in Bangladesh. So, more studies are required to examine the result of the study by covering many more universities of Bangladesh.

Second, the present study has elucidated only the positive aspects and outcomes of ICT equipment but irrational and uncontrolled use of ICT elicits various negative outcomes (Mir & Shakeel 2019). So, this study leaves some light for conducting future research by looking on the negative aspects and effects of ICT tools on students' academic and personal life. Finally, this study did not investigate the relationship of ICT usage pattern with the students' academic performance. Future research, therefore, needs to be conducted by focusing on the impact of ICT usage pattern on the academic performance of the university students.

7. Conclusion

The outcomes clearly showed that there is a notable level of positive perception and attitude among the respondents about the capabilities and impacts of ICT in developing skills and knowledge among themselves. With the positive perception about ICT equipment, usage level of ICT is augmenting among the students of the selected universities of Bangladesh. However, the digital contents are yet to be widely accepted as the preferred most study material (i.e., text books) among the students. Moreover, a lion portion of the respondents use ICT for mostly personal and partly educational purposes. In respect of this,

our study with the above discussed suggestions turns up as a torch bearer for the students. Thus, this study is a significant platform to understanding actual usage pattern and positive perception of ICT among university students in a developing country.

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