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E-COMMERCE: MEANING, BENEFITS AND GROWTH IN INDIA

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Abstract:-

The E-Commerce market is thriving and poised for robust growth in Asia.E-commerce involves an online transaction. Electronic commerce is a term for any type of business, or commercial transaction that involves the transfer of information across an electronic network, primarily the Internet. EC has expanded rapidly over the past decade and is predicted to continue at this rate, or even accelerate because it allows consumers to exchange goods and services with no barriers of time or distance and it is often faster, cheaper and more convenient than the traditional methods of commerce. Electronic commerce as part of the information technology revolution became widely used in the world trade in general and Indian economy in particular.

This paper is outcome of a review of various research studiescarried out on Impact of E-commerce on Indian Commerce.The purpose the study is to explore and bring about the benefits of e-commerce in Indian context. E-commerce has seen unprecedented growth in India in the last decade.

Though the e-commerce is benefiting the business and society at large there are some challenges and limitations also the main being that of financial security, trust, delivery and human less transaction.

Key words: E-commerce, India, internet, globe,impact,benefits,online.

Introduction:-

E-commerce has so many advantages in our life because it makes convenient in daily life of the people. E-commerce stands for electronic commerce and pertains to trading in goods and services through the electronic medium, i.e. the Internet or phone. It can be basically defined as the production, promotion, selling and distribution of products and services in an online environment. As with e-commerce, e-business also has a number of different definitions and is used in a number of different contexts. E-commerce evolved in various means of relationship within the business processes. It can be in the form of electronic advertising, electronic payment system, electronic marketing, electronic customer support service and electronic order and delivery.

Today, major corporations are rethinking their businesses in terms of the Internet and its new culture and capabilities and this is what some see as e-business. E-commerce has an impact on three major stakeholders, namely society, organizations and customers. The cutting edge for business today is e-Commerce. The effects of e-commerce are already appearing in all areas of business, from customer service to new product design. It facilitates new types of information based business processes for reaching and interacting with customers like online advertising and marketing, online order taking and online customer service etc. It can also reduce cost in managing orders and interacting with a

wide range of suppliers and trading partners, areas that typically add significant overheads to the cost of products and services

The objectives of this article are to present a snapshot of the evolution of e-commerce business indicating the chronological order, category of e commerce business, description of organizations involved in e-businesses in India, key characteristics of the firms engaged in e-commerce application, to examine the growth of e-commerce in both physical and financial terms, to evaluate the benefits obtained from e-business and to develop a framework for effective dissemination of e-commerce in India.

Distinct categories of e-commerce:-

Four distinct categories of electronic commerce can be identified as follows:

• ***Business-to-business (B2B):***

Business-to-business (B2B) is commerce transactions between businesses, such as between a manufacturer and a wholesaler, or between a wholesaler and a retailer. Pricing is based on quantity of order and is often negotiable.B2B transactions are largely between industrial manufacturers, partners, and retailers or between companies. Business-to-Business refers to the full spectrum of e-commerce that can occur between two organizations. Among other activities, B2B ecommerce includes purchasing and procurement, supplier management, inventory management, channel management, sales activities, payment management, and service and support.

• ***Business-to-Consumer (B2C):***

Business or transactions conducted directly between a company and consumers who are the end-users of its products or services. B2C transactions take place directly between business establishments and consumers. Although business-to-business transactions play an important part in e-commerce market, a share of e-commerce revenues in developing countries like India is generated from business to consumer transactions.Business-to-Consumer e-commerce refers to exchanges between businesses and consumers. Similar transactions that occur in business-to businesse-commerce also take place in the business-to-consumer context. No doubt, the total value of the B2B transactions is muchlarger than that of the B2C transactions, because typically B2B transactions are of much greater value thanB2C transactions.

• ***Consumer-to-Consumer (C2C):***

Customer to Customer (C2C) markets are innovative ways to allow customers to interact with each other. While traditional markets require business to customer relationships, in which a customer goes to the business in order to purchase a product or service. In customer to customer markets the business facilitates an environment where customers can sell these goods and or services to each other.C2C sites don't form a very high portion of web-based commerce. Most visible examples are the auction sites. Basically, if someone has something to sell, then he gets it listed at an auction sites and others can bidfor it. Consumer-to-Consumer exchanges involve transactions between and among consumers. Theseexchanges may or may not include third-party involvement as in the case of the auction-exchange eBay.

• ***Consumer-to-Business (C2B):***

Consumer-to-business (C2B) is a business model in which consumers individuals create value and businesses consume that value. C2B model, also called a reverse auction or

demand collection model, enables buyers to name or demand their own price, which is often binding, for a specific good or service. The website collects the demand bids then offers the bids to participating sellers. Consumers can band together to form and present themselves as a buyer group to businesses in aconsumer-to-business relationship.

Benefits of e-commerce:-

The benefits of e-commerce include it's the speed of access, a wider selection of goods and services, accessibility, and international reach. E-commerce can have good effects on society which are enables more individuals to work at home, and to do less traveling for shopping, resulting in less traffic on the roads, and lower air pollution, allows some merchandise to be sold at lower prices benefiting the poor ones, enables people in Third World countries and rural areas to enjoy products and services which otherwise are not available to them, facilitates delivery of public services at a reduced cost, increases effectiveness, and/or improves quality. Today, in every aspect of our day to day life internet has become undivided part of our life.

One of the ecommerce benefits is that it has a lower startup cost. Physical retail stores have to pay up to thousands of dollars to rent one of their store locations. Another advantage is that online stores are always open for business. Moreover it's easy to scale the business quickly. You can increase your ad budget when ads are performing well without having to worry too much about keeping up with the demand, especially if you dropship. It's easy to create retargeting ads to retarget customers in your area when running an online business making it one of the most profitable ecommerce benefits.

Another one of the ecommerce benefits is that getting your customers to become impulse buyers is possible. If you have an attractive product photography, one with vibrant color or human emotion, you can create ads that drive impulse buys. Ecommerce benefits like being able to easily display best-sellers makes it easier to show off products to customers. While you can design a brick and mortar store to sway people to buy certain products, it's easier for a customer to find the best-sellers in an online store. Next on the list of ecommerce benefits is that a new brand can sell to customers around the world easily.

E-commerce: growth and prospects in India:-

E-commerce in India is still in budding stage but it offers extensive opportunity in developing countries likeIndia. India's ecommerce industry is on the growth curve and experiencing a surge in growth.Increasing internet and mobile penetration, growing acceptability of online payments and favorable demographics has provided the e-commerce sector in India the unique opportunity to companies connect with their customers. There would be over a five to seven fold increase in revenue generated through e-commerce as compared to last year with all branded apparel, accessories, jewellery, gifts, footwear are available at a cheaper rates and delivered at the doorstep. Many sites are now selling a diverse range of products and services from flowers, greeting cards, and movietickets to groceries, electronic gadgets, and computers. With stock exchanges coming online the time fortrue e-commerce in India has finally arrived.

On the negative side, there are many challenges faced bye-commerce sites in India. The relatively small credit card population and lack of uniform credit agenciescreate a variety of payment challenges unknown in India. Delivery of goods to consumer by couriers andpostal services is not very reliable in smaller cities, towns and rural areas. India has less credit card population, lack of fast postal services in rural India. Accessing the Internet is

currentlyhindered down by slow transmission speeds, frequentdisconnects, cost of Wireless connection and wirelesscommunication standards over which data is transmitted.High-speed-bandwidth Internet connection is not available tomost citizens of the nation at an affordable rate. In India,mostly people are not aware about the English language or not so good in English language. So that for the transaction over internet through electronic devices, language becomes one of the major factors to purchases, hire and sell a particularproduct or services. Multiple issues of trust in e-commercetechnology and lack of widely accepted standards, lack ofpayment gateways, privacy of personal and business dataconnected over the Internet not assured security andconfidentiality of data not in place to deploy ubiquitous ITInfrastructure and its maintenance.However, many Indian Bankshave put the Internet banking facilities. The speed post and courier system has also improved tremendouslyin recent years. Modern computer technology like secured socket layer helps to protect againstpayment fraud, and to share information with suppliers and business partners. With further improvement inpayment and delivery system it is expected that India will soon become a major player in the e-commercemarket.While many companies, organizations, and communities in India are beginning to take advantage of the potential of e-commerce, critical challenges remain to be overcome before e-commerce would become an asset for common people.

Conclusion:-

E-commerce has undeniably become an important part of our society. The World Wide Web is and will have a large part in our daily lives. It is therefore critical that small businesses have their own to keep in competition with the larger websites. With the explosion of internet connectivity through mobile devices like Smartphone and tablets, millions of consumers are making decisions online and in this way enterprises can build the brand digitally and enhance productivity but government policies must ensure the cost effective methods/solutions.Advantages of e-commerce are cost savings, increased efficiency, and customization. In order to understand electronic commerce it is important to identify the different terms that are used, and to assess their origin and usage. These include information overload, reliability and security issues, and cost of access, social divisions and difficulties in policing the Internet. Successful e-commerce involves understanding the limitations and minimizing the negative impact. Ecommerce in India is destined to grow both in revenue and geographic reach. The challenge of establishing consumer trust in e-commerce poses problems and issues that need further research.

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COINCIDENCE AND FIXED POINT THEOREMS IN TOPOLOGICAL SPACES

Savita Sharma

Abstract

The existence of fixed point theory for continuous mappings on Hausdorff topological spaces and regular compact space are proved. Our results are different from known, or are generalizations, extensions and improvements of the corresponding results due to Ciric, Jungck, Liu and Liu et al. Further, the Edelstein result for contractive mappings is extended to Hausdorff (not necessarily completely regular) topological spaces and generalized in many aspects. Examples and Theorems is presented to show that our results are genuine generalizations of the Edelstein result.

Keywords: Fixed point, Hausdorff topological spaces, Pseudo-compact space

Introduction

The purpose of this paper is to provide sufficient conditions for the existence and uniqueness of a fixed point and existence theorems of coincidence point of continuous mapping on Hausdorff topological spaces.

The fixed point theory is a combination of analysis, topology and geometry. The theory of existence of fixed points of maps has been depicted as very important tools in the study of non-linear phenomena. The fixed point theory is much extended when a topological space $(X, \Im)$ is a metric space or a linear topological space. On the other side, if $(X, \Im)$ possess a topological structure only, in such types of spaces the fixed point theory is very rigid. The results for Hausdorff topological spaces are different from known, or are generalization and improvement of the Edelstein [3] result for contractive mappings.

The material of this paper has been derived from the paper of Ciric [2] in which he improved and extended the result due to Jungck [4], Liu [5] and Liu et al. [6].

In 2014, Shah, Hussain and Ciric [7] generalized, extended and improved the results given by Ciric [2], Jungck [4], Liu [5] and Liu et al [6]. Ciric [2] worked on completely regular space for existence of a fixed point and Hausdorff topological space for the uniqueness of a

fixed point. But Shah, Hussain and Ciric [7] extended the results and proved that unique fixed point exists on compact topological space.

The material of my paper has been extended from the paper of Ciric and research paper of Shah, Hussain and Ciric.

Thetheorem (12) is generalization and improvement of the results due to Ciric [2], Edelstein [3], Jungck [4] and Liu et al. [6].

Notation 1 : $\psi = \{F\}$ where $F : X \times X \to [0, \infty)$ is continuous, symmetric and such that $F(x, y) = 0$ if and only if $x = y$.

Theorem 1 : Let $(X, \Im)$ be a completely regular topological space, K be a non-empty pseudo-compact subset of X and $T : K \to K$ be a continuous self mapping on X. Suppose that for some $F \in \Psi$, a mapping T satisfies the following condition:

$$F(T^n(x), T^n(y)) < \max \{F(x, y), \min\{F(x, T(x)), F(y, T(y))\}\} + \lambda \min \{F(x, T(y)), F(y, T(x))\} \quad (1.1)$$

for all $x \neq y$; $x, y \in K$, where $n = n(x, y)$ is a positive integer and λ is an arbitrary positive real number. Then T has at least one fixed point.

Proof : As F and T are continuous functions, this implies that the function $F(x, T(x))$ is continuous on K. Since K is a pseudo-compact subset of X, there exists a point, say $w \in K$ such that

$$F(w, T(w)) = \inf \{F(x, T(x)): x \in K\}. \quad (1.2)$$

Now, to prove that $T(w) = w$. Let us consider, to the contrary, that $w \neq T(w)$. Then from (1.1),

$$F(T^n(w), T^n(T(w))) < \max \{F(w, T(w)), \min\{F(w, T(w)), F(T(w), T(T(w)))\}\}$$
$$+\lambda \min\{F(w, T(T(w))), 0\}$$
$$= \max\{F(w, T(w)), \min\{F(w, T(w)), F(T(w), T(T(w)))\}\}.$$

Thus, since $F(T^n(w), T^n(T(w))) = F(T^n(w), T(T^n(w)))$ and, by (1.2),

$$\min\{F(w, T(w)), F(T(w), T(T(w)))\}\} = F(w, T(w)),$$

we obtained

$$F(T^n(w), T(T^n(w))) < F(w, T(w)),$$

a contradiction by (1.2). Hence, our assumption $w \neq T(w)$ is wrong. So, w is the fixed point of T.

Theorem 2 : Let $(X, \Im)$ be a completely regular topological space, K be a non-empty pseudo-compact subset of X and $T : K \to K$ be a continuous self mapping on X. Suppose that for some $f \in \Psi$, a mapping T satisfies the following condition :

$$F(T^n(x), T^n(y)) < \max\{F(x, y), [\min\{F(x, T(x), F(y, T(y))\} + \min\{F(x, T(y)), F(y, T(x))\}]\} \quad (1.3)$$

for all $x \neq y$; $x, y \in K$, where $n = n(x, y)$ is a positive integer. Then T has a unique fixed point.

Proof : It is clear that (1.3) implies (1.1). Hence, by theorem 1, there exist some $w \in K$ such that $T(w) = w$. Consider that, there is $v \in K$ such that $T(v) = v$ and $v \neq w$. Then by (1.3),

$$F(v, w) = F(T^n(v), T^n(w)) < \max\{F(v, w), [\min\{F(v, T(v)), F(w, T(w))\} + \min\{F(v, w), F(w, v)\}]\} = F(v, w),$$

a contradiction. Thus, T has a unique fixed point.

Theorem 3: Let (X, d) be a metric space and T be a self mapping of X such that

$$d(T(x), T(y)) < d(x, y) \text{ for all } x \neq y; x, y \in X.$$

If there exists a point $x \in X$ whose sequence of iterates $\{T^n(x)\}$ contains a convergent subsequence $\{T^{n_i}(x)\}$, then $\xi = \lim_{i\to\infty} T^{n_i}(x) \in X$ is a unique fixed point of T.

Theorem 4: Let $(X, \Im)$ be a Hausdorff topological space and $T : X \to X$ be a continuous self mapping and for some $F \in \Psi$,

$$F(T(x), T(y)) < \max\{F(x, y), F(x, T(x)), F(y, T(y))\} + \lambda \min\{F(x, T(y)), F(y, T(x))\}, \quad (1.4)$$

for all $x \neq y$; $x, y \in X$, where $\lambda \geq 0$. If there exists a point $x \in X$ whose sequence of iterates $\{T^n(x)\}$ contains a convergent subsequence $\{T^{n_i}(x)\}$, then $\xi = \lim_{i\to\infty} T^{n_i}(x) \in X$ is a fixed point of T. If T satisfies (1.4) with $\lambda = 0$, then T has a unique fixed point.

Proof: Suppose that $x_0 \in X$ is such that a subsequence $\{T^{n_i}(x)\}$ is convergent. Let $x_n = T^n(x_0)$, $n \geq 1$. We may consider that $x_{n+1} \neq x_n$ for all n. For this, if we suppose on the contrary, that $x_{n_0+1} = T(x_{n_0}) = x_{n_0}$ for some n_0, then $x_n = x_{n_0}$ for each $n \geq n_0$. Thus $x_{n_0} = T(x_{n_0}) = \xi = T(\xi)$ and hence the proof.

For any $i \geq 1$, consider

$n_{i+1} = n_i + p_i$,

where $p_i = n_{i+1} - n_i \geq 1$. Then for $p_i > 1$, by (2.1.4),

$$F\left(x_{n_{i+1}}, T\left(x_{n_{i+1}}\right)\right) = F\left(x_{n_i+p_i}, T\left(x_{n_i+p_i}\right)\right) = F\left(T\left(x_{n_i+p_i-1}, T\left(T\left(x_{n_i+p_i-1}\right)\right)\right)\right)$$

$$< \max\left\{F\left(x_{n_i+p_i-1}, T\left(x_{n_i+p_i-1}\right)\right), F\left(x_{n_i+p_i-1}, T\left(x_{n_i+p_i-1}\right)\right), F\left(x_{n_i+p_i}, T\left(x_{n_i+p_i}\right)\right)\right\}$$

$$+\lambda \min\left\{F\left(x_{n_i+p_i-1}, T\left(x_{n_i+p_i}\right)\right), F\left(x_{n_i+p_i}, T\left(x_{n_i+p_i-1}\right)\right)\right\}$$

$$= \max\left\{F\left(x_{n_i+p_i-1}, T\left(x_{n_i+p_i-1}\right)\right), F\left(x_{n_i+p_i-1}, T\left(x_{n_i+p_i-1}\right)\right), F\left(x_{n_i+p_i}, T\left(x_{n_i+p_i}\right)\right)\right\}$$

$$= \max\left\{F\left(x_{n_i+p_i-1}, T\left(x_{n_i+p_i-1}\right)\right), F\left(x_{n_i+p_i}, T\left(x_{n_i+p_i}\right)\right)\right\}.$$

Thus, since $F\left(x_{n_i+p_i}, T\left(x_{n_i+p_i}\right)\right) < F\left(x_{n_i+p_i}, T\left(x_{n_i+p_i}\right)\right)$ is impossible,

hence, $F\left(x_{n_i+p_i}, T\left(x_{n_i+p_i}\right)\right) < F\left(x_{n_i+p_i-1}, T\left(x_{n_i+p_i-1}\right)\right)$. (1.5)

Continuing the process, we obtain

$$F\left(x_{n_i+p_i}, T\left(x_{n_i+p_i}\right)\right) < F\left(x_{n_i+p_i-1}, T\left(x_{n_i+p_i-1}\right)\right)$$

$$< F\left(x_{n_i+p_i-2}, T\left(x_{n_i+p_i-2}\right)\right)$$

$$\ldots$$

$$< F\left(x_{n_i+1}, T\left(x_{n_i+1}\right)\right)$$

$$< F\left(T\left(x_{n_i}\right), T^2\left(x_{n_i}\right)\right).$$

Hence, if $p_i > 1$, then

$$F\left(x_{n_{i+1}}, T\left(x_{n_i+1}\right)\right) < F\left(T\left(x_{n_i}\right), T^2\left(x_{n_i}\right)\right).$$

Clearly, if $p_i = 1$, then $x_{n_{i+1}} = x_{n_i} + 1 = T\left(x_{n_i}\right)$ and therefore

$$F\left(x_{n_{i+1}}, T\left(x_{n_{i+1}}\right)\right) = F\left(T\left(x_{n_i}\right), T^2\left(x_{n_i}\right)\right).$$

So, for all $p_i \geq 1$,

$$F\left(x_{n_{i+1}}, T\left(x_{n_{i+1}}\right)\right) \leq F\left(T\left(x_{n_i}\right), T^2\left(x_{n_i}\right)\right). \quad (1.6)$$

As T is continuous and $x_{n_i} \to \xi$ as $i \to \infty$, we obtain that $T\left(x_{n_i}\right) \to T(\xi), T\left(x_{n_{i+1}}\right) \to T(\xi)$ and $T^2\left(x_{n_i}\right) \to T^2(\xi)$ as $i \to \infty$. Hence, taking the limit in (1.6) as $i \to \infty$, we obtain

$$F(\xi, T(\xi)) \leq F(T(\xi), T^2(\xi)). \quad (1.7)$$

Now we prove that $T(\xi) = \xi$. Assume, to the contrary, that $T(\xi) \neq \xi$. Then by (1.4),

$$F(T(\xi), T^2(\xi)) = F(T(\xi), T(T(\xi))$$

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$$< \max\{F(\xi, T(\xi)), (\max\{F(\xi, T(\xi)), F(T(\xi), T^2(\xi))\}$$
$$+\lambda \min\{F(\xi, T^2(\xi)), F(T(\xi), T(\xi))\})\}$$
$$= \max\{F(\xi, T(\xi)), \max\{F(\xi, T(\xi)), F(T(\xi), T^2(\xi))\}\}$$
$$= \max\{F(\xi, T(\xi)), F(T(\xi), T^2(\xi))\}.$$

Thus, since $F(T(\xi), T^2(\xi)) < F(T(\xi), T^2(\xi))$ is impossible, we get

$$F(T(\xi), T^2(\xi)) < F(\xi, T(\xi)),$$

which is a contradiction by (1.7).

Hence, our assumption is wrong.

Thus, $T(\xi) = \xi$.

Next, to prove that if T satisfies (1.4) with $\lambda = 0$, then T has a unique fixed point.

For **uniqueness**, let us suppose that x and y are two different fixed points of T with $\lambda = 0$.

Then, $T(x) = x$ and $T(y) = y$.

By (1.4), we obtain

$$F(T(x), T(y)) < \max \{F(x, y), F(x, T(x)), F(y, T(y))\}$$
$$= \max\{F(x, y), F(x, x), F(y, y)\}$$
$$= F(x, y)$$
$$= F(T(x), T(y)),$$

which is a contradiction. Hence, our supposition is wrong.

Therefore, T has a unique fixed point with $\lambda = 0$.

This completes the proof.

Theorem 5: Let $(X, \Im)$ be a Hausdorff topological space and $T : X \to X$ be a continuous self mapping and for some $F \in \psi$,

$$F(T(x), T(y)) < \max \{F(x, y), [\max\{F(x, T(x)), F(y, T(y))\}$$
$$+\min\{F(x, T(y)), F(y, T(x))\}]\}. \qquad (1.8)$$

If there exists a point $x \in X$ whose sequence of iterates $\{T^n(x)\}$ contains a convergent subsequence $\{T^{n_i}(x)\}$, then $\xi = \lim_{i\to\infty} T^{n_i}(x) \in X$ is a unique fixed point of T.

Proof: The proof is similar to the proof of theorems 1 and 2.

Example which shows that Theorem 3 is a genuine generalization of the above result.

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Theorem 6: Let $(X, \Im)$ be a completely regular topological space, K be a nonempty pseudo-compact subset of X and T, S, G and H be continuous self mappings on K such that T and S are surjective on K, T commutes with G and H, and S commutes with G and H. If, for some $F \in \psi$, mappings T, S, G and H satisfy the following conditions :

$$F(T(x), S(y)) > \inf\{F(t, P(t)), F(Q(t), P(t)), F(Q(t), P(Q(t))), F(Q(x), Q(y)):$$
$$t \in \{x, y\}, P \in \{T, S\} \text{ and } Q \in \{G, H\}\}, \qquad (1.9)$$

for any $x, y \in K$ with $T(x) \neq S(y)$, then at least one of the following assertions holds:

(1) T has a fixed point in K;

(2) S has a fixed point in K;

(3) T and G have a coincidence point in K;

(4) T and H have a coincidence point in K;

(5) S and G have a coincidence point in K;

(6) S and H have a coincidence point in K.

Proof: As K is a pseudo-compact and F, T, S, G and H are continuous functions, it obtains that the functions F(x, P(x)) and F(Q(x), P(x)) with $P \in \{T, S\}$ and $Q \in \{G, H\}$, are continuous on K, and that there exist a, b, p, q, r and $s \in K$ such that

$$F(a, T(a)) = \inf \{F(x, T(x)) : x \in K\};$$
$$F(b, S(b)) = \inf \{F(x, S(x)) : x \in K\};$$
$$F(G(p), T(p)) = \inf\{F(G(x), T(x)) : x \in K\};$$
$$F(H(q), T(q)) = \inf\{F(H(x), T(x)) : x \in K\};$$
$$F(G(r), S(r)) = \inf\{F(G(x), S(x)) : x \in K\};$$
$$F(H(s), S(s)) = \inf\{F(H(x), S(x)) : x \in K\}.$$

Consider the following cases:

Case 1 : Let

$$F(a, T(a)) = \min\{F(a, T(a)), F(b, S(b)), F(G(p), T(p)),$$
$$F(H(q), T(q)), F(G(r), S(r)), F(H(s), S(s))\}. \qquad (1.10)$$

As $S(K) = K$, there exist some $w \in K$ such that $S(w) = a$. Consider that $T(S(w)) \neq S(w)$, that is, $T(a) \neq a$.

As S commutes with G and H, from (1.9), we obtain

$$F(T(S(w)), S(w)) > \inf\{F(t, P(t)), F(Q(t), P(t)), F(Q(t), PQ(t)), F(Q(S(w)), Q(w)\}$$
$$: t \in \{S(w), w\}, P \in \{T, S\} \text{ and } Q \in \{G, H\}\}$$
$$\geq \min \{F(a, T(a)), F(b, S(b)), F(G(p), T(p)),$$

$$F(H(q), T(q)), F(G(r), S(r), F(H(s), S(s))\}.$$

Thus, from (1.10), we obtain

$F(a, T(a)) > F(a, T(a))$, which is a contradiction.

Hence, $T(a) = a$, that is, a is the fixed point of T.

Case 2 : Consider that

$$F(G(r), S(r)) = \min\{F(a, T(a)), F(b, S(b)), F(G(p), T(p)),$$
$$F(H(q), T(q)), F(G(r), S(r)), F(H(s), S(s))\}. \quad (1.11)$$

As $T(K) = K$, there exist some $z \in K$ such that $T(z) = r$.

Consider that $S(T(z)) \neq G(T(z))$, that is, $S(r) \neq G(r)$.

By (1.9), we obtain

$$F(S(T(z)), T(G(z))) > \inf \{F(t, P(t)), F(Q(t), P(t)), F(Q(t), P(Q(t))),$$
$$F(Q(T(z)), Q(G(z))): t \in \{T(z), G(z)\}, P \in \{T, S\}$$
$$\text{and } Q \in \{G, H\}\}$$
$$\geq \min\{F(a, T(a)), F(b, S(b)), F(G(p), T(p)), F(H(q), T(q)),$$
$$F(G(r), S(r)), F(H(s), S(s))\}.$$

Thus, since $F(S(T(z)), T(G(z))) = F(S(T(z)), G(T(z))) = F(S(r), G(r))$, from (1.11), we obtain

$F(G(r), S(r)) > F(G(r), S(r))$, which is a contradiction.

Hence, $G(r) = S(r)$ which means that r is the coincidence point of S and G.

Hence, proved assertions (1) and (5).

Case 3: Considering the remaining cases

$$F(b, S(b)) = \min\{F(a, T(a)), F(b, S(b)), F(G(p), T(p)),$$
$$F(H(q), T(q)), F(G(r), S(r)), F(H(s), S(s))\},$$
$$F(G(p), T(p)) = \min\{F(a, T(a)), F(b, S(b)), F(G(p), T(p)),$$
$$F(H(q), T(q)), F(G(r), S(r)), F(H(s), S(s))\},$$
$$F(H(q), T(q)) = \min\{F(a, T(a)), F(b, S(b)), F(G(p), T(p)),$$
$$F(H(q), T(q)), F(G(r), S(r)), F(H(s), S(s))\},$$

or

$$F(H(s), S(s)) = \min\{F(a, T(a)), F(b, S(b)), F(G(p), T(p), F(H(q), T(q)),$$
$$F(G(r), S(r)), F(H(s), S(s))\}$$

Similarly, as in the proof of case 1, or case 2, the assertions (2), (3), (4) and (6) hold.

Lemma 1. Let X be a compact topological space and $f : X \to R$ is a function lsca. Then there exists $x_0 \in X$ such that $f(x_0) = \inf\{f(x) : x \in X\}$.

Proof : Suppose that f is lower semi-continuous from above on X. There exists a net $(x_t) \subset X$ such that $f(x_{t'}) \leq f(x_t)$ if $t' \geq t$ and $f(x_t) \to \inf_{x \in X} f(x)$. Since X is compact, without loss of generality, we may suppose that $x_t \to x_0$. By the lower semi-continuity from above of f(x), we obtain $f(x_0) \leq \lim_t f(x_t)$ and therefore

$$f(x_0) = \inf_{x \in X} f(x).$$

Lemma 2 : Let X be a topological space and $f : X \times X \to X$ be a continuous function. If $g : X \to R$ is a lsca function, then the composition function $F=gof : X \times X \to R$ is also lsca.

Proof: Let $(x_0, y_0) \in X \times X$ and consider a net $\{(x_\lambda, y_\lambda)\}_{\lambda \in \Lambda}$ in $X \times X$ converging to (x_0, y_0) such that, for $\lambda_2 \leq \lambda_1$,

$$F(x_{\lambda_1}, y_{\lambda_1}) \leq F(x_{\lambda_2}, y_{\lambda_2})$$

Put $z_\lambda = f(x_\lambda, y_\lambda)$ and $z = f(x_0, y_0)$. Then, as f is continuous and g is lsca, $\lim_{\lambda \in \Lambda} f(x_\lambda, y_\lambda) = f(x_0, y_0) \in X$ and

$$g(z) = g(f(x_0, y_0)) \leq \lim_{\lambda \in \Lambda} g(f(x_\lambda, y_\lambda)) = \lim_{\lambda \in \Lambda} g(z_\lambda)$$

where $g(z_{\lambda_1}) \leq g(z_{\lambda_2})$ for $\lambda_2 \leq \lambda_1$.

Hence, $f(x_0, y_0) \leq \lim_{\lambda \in \Lambda} f(x_\lambda, y_\lambda)$ and therefore F is lsca.

Remark: Let X be a topological space. Let $f : X \to X$ be a continuous function and $F : X \times X \to R$ be a lsca function. Then $g: X \to R$ defined by $g(x) = F(x, f(x))$ is also lsca. In fact, let $\{x_\lambda\}_{\lambda \in \Lambda}$ be a net in X converging to a point $x \in X$.

As f is continuous, so $\lim_{\lambda \in \Lambda} f(x_\lambda) = f(x)$

Let us consider that $g(x_{\lambda_1}) \leq g(x_{\lambda_2})$ for $\lambda_2 \leq \lambda_1$; then, since F is lsca, we obtain

$$g(x) = F(x, f(x)) \leq \lim_{\lambda \in \Lambda} F(x_\lambda, f(x_\lambda)) = \lim_{\lambda \in \Lambda} g(x_{\lambda_1})$$

and therefore g is lsca.

Theorem 7: Let X be a topological space, K be a nonempty compact subset of X and $f : K \to K$ be a continuous function. If $F \in \Phi$ and

$$F(fx, fy) < \max\{F(x, y), \min\{F(x, fx), F(y, fy)\}\}$$
$$+\lambda \min\{|F(x, fy)|, F(fx, y)\} \qquad (1.12)$$

for all x, y ∈ K with x ≠ y and λ an arbitrary positive real number, then f has at least one fixed point.

Proof : Consider φ : K → (–∞,∞) which is defined by φ(x) = F(x, fx)) for x ∈ K.

Since f is continuous and F is lsca, therefore, from Remark, it obtains that the function φ is also lsca on K. By Lemma (1), there exists a point, say, w ∈ K such that

$$\varphi(w) = F(w, f(w)) = \inf\{\varphi(x) : x \in K\}. \qquad (1.13)$$

Now, to show that f(w) = w.

Let us consider, to the contrary, that w ≠ f(w).

Then by (1.12),

$$F(f(w), f(f(w))) < \max\{F(w, f(w)), \min\{F(w, f(w)), F(f(w), f(f(w)))\}\}$$
$$+\lambda \min\{|F(w, f(f(w)))|, 0\}$$
$$= \max\{F(w, f(w)), \min\{F(w, f(w)), F(f(w), f(f(w)))\}\}.$$

From (1.13),

$$\min\{F(w, f(w)), F(f(w), f(f(w)))\} = F(w, f(w)).$$

Therefore, we obtain

$$F(f(w), f(f(w))) < F(w, f(w)),$$

which is a contradiction to (1.13).

Hence, f(w) = w, that is, w is a fixed point of f.

Corollary 1: Let X be a compact topological space, K be a closed subset of X and f: K → K be a continuous function. If F ∈ Φand

$$F(fx, fy) < \max\{F(x, y), \min\{F(x, fx), F(y, fy)\}\}+\lambda \min\{|F(x, fy)|, F(fx, y)\}$$

for all x, y ∈ K with x ≠ y and λ is an arbitrary positive real number, then f has at least one fixed point.

Corollary 2: Let X be a topological space, K be a non-empty compact subset of X and f: K → K be a continuous function. If F ∈Φ is symmetric and

$$F(fx, fy) < \max\{F(x, y), \min\{F(x, fx), F(y, fy)\}\}+\lambda \min\{|F(x, fy)|, F(fx, y)\}$$

for all x, y ∈ K with x ≠ y and λ is an arbitrary positive real number, then f has at least one fixed point.

Corollary 3: Let (X, d) be a metric space, K be a nonempty compact subset of X and f: K → K be a continuous function. If F ∈ Φ and

$$d(fx, fy) < \max\{d(x, y), \min\{d(x, fx), d(y, fy)\}\} +\lambda\min\{d(x, fy), d(fx, y)\}$$

for all x, y ∈ K with x ≠ y and λ is an arbitrary positive real number, then f has at least one fixed point.

Theorem 8: Let X be a topological space, K be a nonempty compact subset of X and f: K → K be a continuous mapping. Suppose that for F ∈ Φ, the mapping f satisfies the following condition :

$$F(f(x), f(y)) < \max\{F(x, y), [\min\{F(x, f(y)), F(y, f(y))\} + \min\{F(x, f(y)), F(f(x), y)\}]\} \quad (1.14)$$

for all x, y ∈ K with x ≠ y. Then f has a unique fixed point.

Proof: Since (1.12) is implied by (1.14), thus, by theorem (7), there exists some w ∈ K such that f(w) = w.

Next, to prove the **uniqueness** of fixed point, show that, for v, w ∈ K such that

f(v) = v and f(w) = w then v = w.

Let us consider that there is v ∈ K such that

f(v) = v, f(w)=w and v ≠ w.

Then by (1.14),

$$\begin{aligned} f(v, w) &= F(f(v), f(w)) \\ &< \max\{F(v, w), [\min\{F(v, f(v)), F(w, f(w))\} + \min\{F(v, f(w)), F(f(v), w)\}]\} \\ &= \max\{F(v, w), [\min\{F(v, v), F(w, w)\} + \min\{F(v, w), F(v, w)\}]\} \\ &= F(v, w), \end{aligned}$$

which is a contradiction. Thus v = w and hence, f has a unique fixed point.

Theorem 9: Let X be a topological space, K be a compact subset of X and f : K→K be a continuous function. If F ∈ Φand

$$F(f^n x, f^n y) < \max\{F(x, y), \min\{F(x, f^n x), F(y, f^n y)\}\} + \lambda \min\{|F(x, f^n y)|, F(f^n x, y)\} \quad (1.15)$$

for all x, y ∈ K with x ≠y; n = n(x, y) ∈ N and λ is an arbitrary positive real number, then f has atleast one periodic point.

Proof : Let φ : K → (–∞, ∞), defined by

$$\varphi(x) = F(x, f^n(x)),\ x \in K.$$

Since f is continuous and F is lsca, thus, from Remark, it obtains that the function φ is also lsca on K. By Lemma (1), there exists a point, say w ∈ K such that

$$\varphi(w) = F(w, f^n(w)) = \inf\{\varphi(x) : x \in K\}. \qquad (1.16)$$

To prove theorem, show that $f^n(w) = w$.

Let us consider, to the contrary, that $w \neq f^n(w)$.

Then by (1.15),

$$F(f^n(w), f^n(f^n(w))) < \max\{F(w, f^n(w)), \min\{F(w, f^n(w)), F(f^n(w), f^n(f^n(w)))\}\}$$
$$+\lambda\min\{|F(w, f^n(f^n(w)))|, 0\}$$
$$= \max\{F(w, f^n(w)), \min\{F(w, f^n(w)), F(f^n(w), f^n(f(w)))\}\}$$
$$+\lambda.0$$
$$= \max\{F(w, f^n(w)), \min\{F(w, f^n(w)), F(f^n(w), f^n(f^n(w)))\}\}.$$

Since from (1.16),

$$\min\{F(w, f^n(w)), F(f^n(w), f^n(f^n(w)))\} = F(w, f^n(w)),$$

we obtain

$$F(f^n(w), f^n(f^n(w))) < F(w, f^n(w)),$$

which is a contradiction to (1.16).

Hence, $f^n(w) = w$ for some $n \in N$ and thus w is a periodic point of f.

Theorem 10: Let X be a topological space, $f: X \to X$ be a continuous function. Let for $F \in \Phi$, the mapping f satisfying the contractive condition :

$$F(fx, fy) < \max\{F(x, y), \min\{F(x, fx), F(y, fy)\}\}$$
$$+\lambda\min\{|F(x, fy)|, F(fx, y)\}$$

for all $x, y \in X$ with $x \neq y$ and λ is an arbitrary positive real number. If, for $x_0 \in X$ and for some $K \subseteq X$

$K = f(K) \cup \{x_0\} \Rightarrow K$ is relatively compact, then f has a fixed point.

Proof : Let $x_1 = f(x_0)$ and consider the sequence $\{x_n\}$ in X as follows:

$$x_{n+1} = f(x_n), \text{ for } n \geq 1.$$

Suppose $A = \{x_n : n \geq 1\}$, then

$$A = \{x_{n+1} : n \geq 1\} \cup \{x_1\}$$
$$= f(A) \cup \{x_1\}$$

and so, by hypothesis, A is relatively compact.

Let $\varphi : \overline{A} \to R$, defined by

$$\varphi(x) = F(x, f(x)).$$

As f is continuous and F is lsca, so, from Remark, φ is lsca and thus, by Lemma (1), φ has a minimum, say, at $a \in \overline{A}$. Hence by theorem (7), a is a fixed point of f.

Result: Let X be a Hausdorff topological space and $f : X \to X$ be a continuous self mapping and such that for some $F \in \psi$,

$$F(f(x), f(y)) < \max\{F(x, y), F(x, f(x)), F(y, f(y))\}$$
$$+\lambda \min\{F(x, f(y)), F(y, f(x))\}, \qquad (1.17)$$

for all $x, y \in X$ with $x \neq y$ and $\lambda \geq 0$. If there exists a point $x \in X$ whose sequence of iterates $\{f^n(x)\}$ contains a convergent subsequence $\{f^{n_i}(x)\}$, then

$$\xi = \lim_{i\to\infty} f^{n_i}(x) \in X$$

is a fixed point of f. If f satisfies (1.17) with $\lambda = 0$, then f has the unique fixed point.

The following theorem is modification of the Result.

Theorem 11: Let X be a topological space, $f : X \to X$ be a continuous mapping and for some continuous

$$F : X \times X \to R \text{ (with } F(x, y) = 0 \text{ when } x = y),$$
$$F(f(x), f(y)) < \max\{F(x, y), [\max\{F(x, f(x)), F(x, f(y))\}$$
$$+\lambda \min\{F|x, f(y))|, F(f(x), y)\}]\}, \qquad (1.18)$$

for all $x, y \in X$ with $x \neq y$ and $\lambda \geq 0$. If there exists a point $x_0 \in X$ whose sequence of iterates $\{f^n(x_0)\}$ contains a convergent subsequence $\{f^{n_i}(x_0)\}$, then $a = \lim_{i\to\infty} f^{n_i}(x_0) \in X$ is a fixed point of f. If $\lambda = 0$, then f has a unique fixed point.

Proof : Suppose $x_0 \in X$ and consider the sequence $\{x_n\}$ in X such that $x_n = f^n(x_0)$, for $n \geq 1$. Suppose $\{f^{n_i}(x_0)\}$ be a subsequence of $\{x_n\}$ such that $f^{n_i}(x_0) \to a \in X$, as $i \to \infty$. We may assume that $x_{n+1} \neq x_n$ for each n.

Indeed, if we suppose, to the contrary, that $x_{n_0+1} = f^{n_0+1}(x_0) = f(x_{n_0}) = x_{n_0}$ for some n_0, then $x_n == x_{n_0}$ for all $n \geq n_0$ and thus

$$x_{n_0} = f(x_{n_0}) = a = f(a) \text{ and hence the proof.}$$

For $i \geq 1$, set

$$p_i = n_{i+1} - n_i \geq 1, \text{ that is, } n_{i+1} = n_i + p_i.$$

Case 1 : Let $p_i > 1$. Then by (2.1.18), we obtain

$$F(x_{n_{i+1}}, f(x_{n_{i+1}})) = F(x_{n_i+p_i}, f(x_{n_i+p_i}))$$

$$= F\left(f\left(x_{n_i+p_i-1}\right), f\left(f\left(x_{n_i+p_i-1}\right)\right)\right)$$

$$< \max\left\{F\left(x_{n_i+p_i-1}, f\left(x_{n_i+p_i-1}\right)\right),\right.$$

$$\left[\max\left\{F\left(x_{n_i+p_i-1}, f\left(x_{n_i+p_i-1}\right)\right), F\left(x_{n_i+p_i}, f\left(x_{n_i+p_i}\right)\right)\right\}\right.$$

$$\left.\left.+\lambda \min\left\{\left|F\left(x_{n_i+p_i-1}, f\left(x_{n_i+p_i-1}\right)\right)\right|, F\left(f\left(x_{n_i+p_i-1}\right), x_{n_i+p_i}\right)\right\}\right]\right\}$$

$$= \max\left\{F\left(x_{n_i+p_i-1}, f\left(x_{n_i+p_i-1}\right)\right), F\left(x_{n_i+p_i-1}, f\left(x_{n_i+p_i-1}\right)\right), F\left(x_{n_i+p_i}, f\left(x_{n_i+p_i}\right)\right)\right\}$$

$$= \max\left\{F\left(x_{n_i+p_i-1}, f\left(x_{n_i+p_i-1}\right)\right), F\left(x_{n_i+p_i}, f\left(x_{n_i+p_i}\right)\right)\right\}$$

$$= \max\left\{F\left(x_{n_i+p_i-1}, f\left(x_{n_i+p_i-1}\right)\right), F\left(x_{n_i+1}, f\left(x_{n_i+1}\right)\right)\right\}.$$

Thus, since $F\left(x_{n_{i+1}}, f\left(x_{n_{i+1}}\right)\right) = F\left(x_{n_i+p_i}, f\left(x_{n_i+p_i}\right)\right) < F\left(x_{n_i+1}, f\left(x_{n_i+1}\right)\right)$ is false, we obtain

$$F\left(x_{n_{i+1}}, f\left(x_{n_{i+1}}\right)\right) = F\left(x_{n_i+p_i}, f\left(x_{n_i+p_i}\right)\right) < F\left(x_{n_i+p_i-1}, f\left(x_{n_i+p_i-1}\right)\right), \text{ where } p_i > 1. \quad (1.19)$$

Continuing the above process, we obtain

$$F\left(x_{n_{i+1}}, f\left(x_{n_{i+1}}\right)\right) = F\left(x_{n_i+p_i}, f\left(x_{n_i+p_i}\right)\right)$$

$$< F\left(x_{n_i+p_i-1}, f\left(x_{n_i+p_i-1}\right)\right)$$

$$....$$

$$< F\left(x_{n_i+1}, f\left(x_{n_i+1}\right)\right)$$

$$= F\left(f\left(x_{n_i}\right), f^2\left(x_{n_i}\right)\right).$$

Hence, if $p_i > 1$, then

$$F\left(x_{n_{i+1}}, f\left(x_{n_{i+1}}\right)\right) < F\left(f\left(x_{n_i}\right), f^2\left(x_{n_i}\right)\right).$$

Case 2 : Suppose $p_i = 1$. Then

$$x_{n_{i+1}} = x_{n_i+1} = f^{n_i+1}(x_0) = f\left(f^{n_i}(x_0)\right) = f\left(x_{n_i}\right) \text{ and}$$

Therefore

$$F\left(x_{n_{i+1}}, f\left(x_{n_{i+1}}\right)\right) = F\left(f\left(x_{n_i}\right), f^2\left(x_{n_i}\right)\right).$$

Thus, for each $p_i \geq 1$, we obtain

$$F\left(x_{n_{i+1}}, f\left(x_{n_{i+1}}\right)\right) \leq F\left(f\left(x_{n_i}\right), f^2\left(x_{n_i}\right)\right). \quad (1.20)$$

Since f is continuous and $x_{n_i} \to a$ as $i \to \infty$, it obtains that $f\left(x_{n_i}\right) \to f(a)$ and $f^2\left(x_{n_i}\right) \to f^2(a)$ as $i \to \infty$.

As $F : X \times X \to R$ is continuous, we obtain

$$F(a, f(a)) = \lim_{i\to\infty} F\left(x_{n_{i+1}}, f\left(x_{n_{i+1}}\right)\right).$$

and

$$F(f(a), f^2(a)) = \lim_{i\to\infty} F\left(f\left(x_{n_i}\right), f^2\left(x_{n_i}\right)\right).$$

Combined with (1.20), these two equations imply that

$$F(a, f(a)) \le F(f(a), f^2(a)). \qquad (1.21)$$

Now, to prove f(a) = a.

Assume, to the contrary, that f(a) ≠ a.

Then by (1.18),

$$\begin{aligned} F(f(a), f^2(a)) &= F(f(a), f(f(a))) \\ &< \max\{F(a, f(a)), [\max\{F(a, f(a)), F(f(a), f^2(a))\} \\ &\qquad +\lambda\min\{|F(a, f^2(a))|, F(f(a), f(a))\}]\} \\ &= \max\{F(a, f(a)), \max\{F(a, f(a)), F(f(a), f^2(a))\}\} \\ &= F(f(a), f^2(a)), \end{aligned}$$

which is a contradiction.

Hence, f(a) = a and thus f has a fixed point.

Further, we show that if λ = 0, then f has a unique fixed point.

Assume, to the contrary, that f has not a unique fixed point, that is, there is b ∈ X such that f(b) = b and b ≠ a for λ = 0.

Then by (1.18),

$$\begin{aligned} F(a, b) &= F(f(a), f(b)) \\ &< \max\{F(a, b), [\max\{F(a, f(a)), F(b, f(b))\}]\} \\ &= \max\{F(a, b), [\max\{F(a, a), F(b, b)\}]\} \\ &= \max\{F(a, b), \max\{0, 0\}\} \\ &= F(a, b), \end{aligned}$$

which is a contradiction.

Hence a = b and thus, f has a unique fixed point for λ = 0.

Theorem 12: Let X be a topological space, f : X → X be a continuous mapping and for some F ∈ Φ, we have

$$\begin{aligned} F(f(x), f(y)) < \max\{&F(x, y), [\max\{F(x, f(x)), F(y, f(y))\} \\ &+\min\{|F(x, f(y))|, F(f(x), y)\}]\}, \end{aligned} \qquad (1.22)$$

for all x, y ∈ X with x ≠ y. If there exists a point $x_0 \in X$ whose sequence of iterates $\{f^n(x_0)\}$ contains a convergent subsequence $\{f^{n_i}(x_0)\}$, then $a = \lim_{i\to\infty} f^{n_i}(x_0) \in X$ is a unique fixed point of f.

Proof : Since (1.18) is implied by (1.22), so by Theorem (11), there exists some a ∈ Ksuch that f(a)=a. Assume, to the contrary, that there exists b∈K such that f(b) = b and a ≠ b.

Then by (1.22), we obtain

$$F(a, b) = F(f(a), f(b))$$
$$< \max\{F(a, b), [\max\{F(a, f(a)), F(b, f(b))\} + \min\{|F(a, f(b))|, F(f(a), b)\}]\}$$
$$= \max\{F(a, b), [\max\{F(a, a), F(b, b)\} + \min\{|F(a, b)|, F(a, b)\}]\}$$
$$= \max\{F(a, b), [0 + F(a, b)]\} \text{ as } |F(a, b)| \geq F(a, b)$$
$$= F(a, b),$$

which is a contradiction. Thus a = b and hence, f has a unique fixed point.

Theorem 13: Let X be a topological space, K be a nonempty compact subset of X and T, S, G, H : K → K be continuous self mappings on K such that T, S are surjective on K, T commutes with {G, H} and S commutes with {G, H}. If for F ∈ Φ, the four mappings T, S, G and H satisfy the following condition :

$$F(S(x), T(y)) > \inf\{F(t, P(t)), F(Q(t), P(t)), F(Q(t), P(Q(t))), F(Q(x), Q(y)) : t \in \{x, y\}, P \in \{T, S\} \text{ and } Q \in \{G, H\}\} \quad (1.23)$$

for any x, y ∈ K with T(x) ≠ S(y), then at least one of the following assertions hold:

(1) T has a fixed point in K;

(2) S has a fixed point in K;

(3) T and G have a coincidence point in K;

(4) T and H have a coincidence point in K;

(5) S and G have a coincidence point in K;

(6) S and H have a coincidence point in K.

Proof : Since K is a compact and F, T, S, G and H are continuous functions, it follows from Remark, it obtained that the functions x → F(x, P(x)) and x → F(Q(x), P(x)) with P ∈ {T, S} and Q ∈ {G, H}, are continuous on K, and by Lemma (1) there exist a, b, p, q, r and s ∈ K such that

$F(a, T(a)) = \inf\{F(x, T(x)) : x \in K\};$

$F(b, S(b)) = \inf\{F(x, S(x)) : x \in K\};$

$F(G(p), T(p) = \inf\{F(G(x), T(x)) : x \in K\};$

$F(H(q), T(q) = \inf\{F(H(x), T(x)) : x \in K\};$

$F(G(r), S(r) = \inf\{F(G(x), S(x)) : x \in K\};$

$F(H(s), S(s) = \inf\{F(H(x), S(x)) : x \in K\}.$

To prove the results, require to consider the following cases:

Case (1) : Suppose that

$$F(a, T(a)) = \min\{F(a, T(a)), F(b, S(b)), F(G(p), T(p)), F(H(q), T(q)), F(G(r), S(r)), F(H(s), S(s))\}. \quad (1.24)$$

As $S(K) = K$, there exists some $w \in K$ such that $S(w) = a$. Assume that $T(S(w)) \neq S(w)$, that is, $T(a) \neq a$.

Since S commutes with G and H, by (1.23), we obtain

$$F(S(w), T(S(w))) > \inf \{F(t, P(t), F(Q(t), P(t)), F(Q(t), PQ(t), F(Q(S(w)), Q(w)) : t \in \{S(w), w\}, P \in \{T, S\} \text{ and } Q \in \{G, H\}\}$$

$$= \min \left\{ \inf_{t\in\{S(w), w\}} \{F(t, P(t))\}, \inf_{t\in\{S(w), w\}} \{F(Q(t), P(t))\} \right.$$

$$= \inf_{t\in\{S(w), w\}} \{F(Q(t), PQ(t))\}, \inf_{t\in\{S(w), w\}} \{F(S(Q(w), Q(w))\} : P \in \{T, S\} \text{ and } Q \in \{G, H\}\}$$

$$\geq \min\{F(a, T(a)), F(b, S(b)), F(G(p), T(p)), F(H(q), T(q), F(G(r), S(r)), F(H(s), S(s))\}.$$

As

$F(t, P(t)) = F(t, T(t))$, or $F(t, P(t)) = F(t, S(t))$,

then, $\inf_{t\in\{S(w), w\}} \{F(t, P(t))\} \geq \inf_{t\in K} \{F(t, P(t))\} = \min\{F(a, T(a)), F(b, S(b))\}$

Similarly, since

$F(Q(t), P(t)) = F(G(t), T(t))$, or $F(Q(t), P(t)) = F(G(t), S(t))$,

or $F(Q(t), P(t)) = F(H(t), T(t))$, or $F(Q(t), P(t)) = F(H(t), S(t))$,

implies that,

$$\inf_{t\in\{S(w), w\}} F(Q(t), P(t)) \geq \min\{F(G(p), T(p)), F(G(r), S(r)), F(H(q), T(q)), F(H(s), S(s))\}$$

Further,

F(Q(t), PQ(t)) = F(Q(t), TQ(t)) or F(Q(t), PQ(t)) = F(Q(t), SQ(t)),

then, we obtain

$$\inf_{G(t)\in K, H(t)\in K; t\in\{S(w), w\}} F(Q(t), TQ(t)) \geq \inf_{x\in K} F(x, T(x)) = F(a, T(a)),$$

$$\inf_{G(t)\in K, H(t)\in K; t\in\{S(w), w\}} F(Q(t), SQ(t)) \geq \inf_{x\in K} F(x, S(x)) = F(b, S(b)).$$

Also, since

F(Q(S(w), Q(w)) = F(S(Q(w)), Q(w)) = F(S(G(w)), G(w)), or

F(Q(S(w)), Q(w)) = F(S(G(w)), H(w)), or F(Q(S(w)), Q(w)) = F(S(H(w)), G(w)), ...

then, we obtain

$$\inf_{G(w)\in K, H(w)\in K} F(Q(S(w), Q(w)) \geq \inf_{x\in K} F(S(x), x) = F(b, S(b)).$$

Therefore, we get

F(S(w), T(S(w))) > inf{F(t), P(t)), F(Q(t), P(t)), F(Q(t), PQ(t), F(Q(S(w)), Q(w))

≥ min{F(a, T(a)), F(b, S(b)), F(G(p), T(p)),

F(H(q), T(q)), F(G(r), S(r)), F(H(s), S(s))}.

Thus, from (1.24), we obtain

F(S(w), T(S(w))) = F(a, T(a))

> min{F(a, T(a)), F(b, S(b)), F(G(p), T(p)),

F(H(q), T(q)), F(G(r), S(r)), F(H(s), S(s))}

= F(a, T(a)),

which is a contradiction.

Hence T(a) = a, that is, a is the fixed point of T.

Case (2) : Assume that

F(G(r), S(r)) = min{F(a, T(a)), F(b, S(b)), F(G(p), T(p)),

F(H(q), T(q)), F(G(r), S(r)), F(H(s), S(s))}. (1.25)

Since T(K) = K, there exists some z ∈ K such that T(z) = r.

Assume that S(T(z)) ≠ G(T(z)), that is, S(r) ≠ G(r).

By (1.23), we obtain

F(T(G(z), S(T(z))) > inf{F(t, P(t)), F(Q(t), P(t)),

F(Q(t), PQ(t))), F(Q(T(z)), Q(G(z)))

: t ∈{T(z), G(z)}, P∈{T, S} and Q ∈{G, H}}

≥ min{F(a, T(a), F(b, S(b)), F(G(p), T(p)),

$$F(H(q), T(q)), F(G(r), S(r)), F(H(s), S(s))\}.$$

Thus, since $F(T(G(z)), S(T(z))) = F(G(T(z)), S(T(z))) = F(G(r), S(r))$,

from (1.25), we obtain

$$F(G(r), S(r)) > F(G(r), S(r)),$$

which is a contradiction.

Hence, $G(r) = S(r)$ which means that r is the coincidence of S and G. Thus, Assertion (1) and (5) are proved.

Next, we discuss about the remaining cases :

$$F(b, S(b)) = \min\{F(a, T(a)), F(b, S(b)), F(G(p), T(p)),$$
$$F(H(q), T(q)), F(G(r), S(r)), F(H(s), S(s))\}.$$
$$F(G(p), T(p)) = \min\{F(a, T(a)), F(b, S(b)), F(G(p), T(p)),$$
$$F(H(q), T(q)), F(G(r), S(r)), F(H(s), S(s))\}.$$
$$F(H(q), T(q)) = \min\{F(a, T(a)), F(b, S(b)), F(G(p), T(p)),$$
$$F(H(q), T(q)), F(G(r), S(r)), F(H(s), S(s))\}.$$

or

$$F(H(s), S(s)) = \min\{F(a, T(a)), F(b, S(b)), F(G(p), T(p)).$$
$$F(H(q), T(q), F(G(r), S(r)), F(H(s), S(s))\}.$$

and proceeding on lines as in the proof of Assertion (1) or Assertion (5), Assertions (2), (3), (4) and (6) also hold.

Corollary 4: Let X be a topological space, K be a non empty compact subset of X and T, S, G, H : $K \to K$ be continuous self mapping on K such that S, T are surjective on K and commutes with G, H. If, for $F \in \Phi$, the four mappings T, S, G and H satisfy the following condition :

$$F(S(x), T(y)) > \text{Sup}\{F(t, P(t)), F(Q(t), P(t)), F(Q(t), P(Q(t))), F(Q(x), Q(y))$$
$$: t \in \{x, y\}, P \in \{T, S\} \text{ and } Q \in \{G, H\}\}$$

for any $x, y \in K$ with $T(x) \neq S(y)$, then at least one of the following assertions hold:

(1) T has a fixed point in K;

(2) S has a fixed point in K;

(3) T and G have a coincidence point in K;

(4) T and H have a coincidence point in K;

(5) S and G have a coincidence point in K;

(6) S and H have a coincidence point in K.

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NEW COMPATIBILITY POLICY FOR E-COMMERCE BASED WEB SERVICES SECURITY

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Abstract
Now security is a growing in concern and for most organizations supporting business-to business interactions. In security policy files the web services providers and consumers document their primary and alternative security policy requirements and capabilities these are defined by WS-Policy, WS-Security Policy and WS-Security syntax. For the exchanges of secure message to the satisfaction of all parties, the security requirements of both web services need to be satisfied. This paper explains how security policies can be created. An analysis of the policy intersection algorithm highlights its drawbacks for finding mutually compatible policies. An important aspect not yet considered is the interrelated effect that security policy assertion choices have on each other. A proposal is made on how the assertions of two security policies should be considered, in order to create a secure, mutually agreed-upon security policy that will satisfy the requirements of both parties.
Keywords- WS-Policy; WS-Security Policy; Policy Intersection, Security Policy Assertions, Policy Compatibility.

Introduction
E-commerce supported by web services technologies has been on the rise. Businesses experience is the benefits that web services technology provides as they extend their business processes beyond the physical boundaries of their enterprise. Security requirements of B2B web services are becoming increasing important. In Internet of services (IoS), services need to interact continuously, across domains and even international borders.

Web service providers specify their security requirements and capabilities in machine-readable security policies that web services consumers have to conform to. If they cannot conform, they need to search for other web services providers. In these modern days, web services providers need to be more flexible and accommodate a variety of security requirements.

The compatibility between the security policies of web services consumers and providers is determined by policy intersection. Policy intersection suffers from a number of limitations as semantic meaning of policy assertions is not considered.

To harness the flexibility needed in managing the security of a web service, new approaches are required, where security policies of both web services providers and consumers are carefully considered to create a security policy acceptable to both parties. As the underlying platforms hosting B2B web service interactions are becoming more complex, where hosts are networked in complicated topologies using firewalls and intrusion detection systems, the definition of an adequate security policy is no easy task. The configuration of nonfunctional aspects such as security thus requires a deep understanding by administrators.

In this paper an analysis of security policy intersection has given .Currently, WS-Policy and related WS-Security Policy specifications determine policy compatibility by using policy intersection. The main contribution of this paper is to give an overview of the limitations of policy intersection, and to highlight additional considerations that should be taken into account when mutually compatible policies are defined.

Section II begins the paper by reviewing web services and their corresponding security specifications using an example to highlight important aspects. Section III analyses the intersection of two security policies. Section IV gives a high level model of aspect to consider and section V concludes the paper.

Backgound

Web services security is implemented is a unique way. The WS-Policy specification defines an XML Schema that defines the main structure of a security policy. Web services and security specifications namely WS-Security, WS-Policy and WS Security Policy are briefly discussed next.

A. Web Services

Via the use of explicitly defined interfaces, web services are exposed to consumers documented in Web Services Definition Language (WSDL) files. The WSDL syntax cannot be used to specify non-functional characteristics for web services such as quality-of-service or security. To specify such nonfunctional requirements, additional policies are needed. For security, there are many policy specifications that can additionally be used such as WS-Policy, WSPL and WS-Agreement. To better understand the security requirements of web service interactions, consider the following example: Web Supply is a web service provider supporting the sale of digital media such as music Compact Discs (CDs) to retail stores. Web Supply provides services that allow online customers of web services consumers to search a selection of music on CD's, order and pay for the ordered CD's. As confidential information is exposed such as client information and credit card numbers, SOAP messages need to be well protected. As a consumer, New Hits Music is a retail CD store that has recently discovered Web Supply as provider of services. New Hits Music requires the integration of the services of Web Supply into their application environment. New Hits Music is a new company and have not yet managed to support a comprehensive number of security mechanisms. When credit card numbers are exchanged, they have to be protected by security mechanisms such as encryption algorithms that both parties can successfully apply to a part of the SOAP message. In order to be able to specify security mechanisms, WS-Security is discussed next.

B. WS-Security

Before reaching the destination the web service message passes through untrusted medium, point-to-point security mechanisms such as HTTPS are not sufficient. WS-Security provides end-to-end security for web services by extending SOAP to include security mechanisms, such as Kerberos, XML signature and XML encryption. WS-Security specifies three main mechanisms:

- Security tokens for authentication,
- Encryption of SOAP messages for confidentiality,
- Signing of SOAP messages for integrity and non repudiation.

WS-Security uses a variety of signature formats, encryption algorithms and authentication tokens. To imbed security into a SOAP message, a security header is added to it as shown in Figure -1 The <wsse:UsernameToken> tag contains all information needed to send a secure message with a username, password and timestamp. The username tag, <wsse:Username> requires a plain text username; "Bob" and the <wsse:Password

```
<Wsse:UsernameToken>
<wsse:Username>Bob</wsse: Username>
<wsse:Password Type="wsse:PasswordDigest">
Pea-s=s!w@o$r(d
</wsse:Password>
<wsse:Nonce>abc123</wsse:Nonce>
<wsu:Created
xmlns:wsu="http://schemas.xmlsoap.org
/ws/2002/07/utility">
2010-04-08T13:30:30Z
</wsu:Created></wsse:UsernameToken
```

Figure-1: WS-Security Header with Username Token

Type="wsse:PasswordDigest>" tag is the password digest. Because a password digest is required, a nonce is used inside the <wsse:Nonce> tags. A timestamp is inserted between the <wsu:Created> tags to give the SOAP message additional protection.

WS-Security only specifies platform-independent security mechanisms. In order to allow a consumer to understand how to format a security header, and to explicitly state all other security requirements and capabilities, a security policy needs to be defined.

C. WS-Policy

WS-Policy is a framework for defining XML based policies and has been standardized in 2007. Policies consist of policy assertions that represent domain-specific capabilities, constraints or requirements, specified by for example, WS-Security and WS-Security Policy. Policy assertions are grouped together to form a policy expression. Each policy has a subject such as a web service port, operation or message to which the policy can be bound.

Figure 2 is an example of a policy defined in WS-Policy. The policy uses three operators to control assertions namely:

<wsp:Policy>,<wsp:All>,and<wsp:ExactlyOne>

. Namespaces wsu, sp and wsp represent the WS Services

Utility, WS-Security and WS-SecurityPolicy

namespaces respectively. <wsp:Policy> is a container for nested policy assertions. Each <wsp:Policy> has a unique ID value by use of the wsu:id attribute. The <wsp:All> operator requires that all child assertions contained within it are satisfied.

```
<wsp:Policy wsu:Id="WebSupplyPolicy">
<wsp:All>
<wsp:ExactlyOne>
<sp:UsernameToken>...</sp:UsernameToken>
<sp:X509Token>...</sp:X509Token>
</wsp:ExactlyOne>
<sp:IncludeTimestamp/>
</wsp:All>
</wsp:Policy>
```

Figure-2: Web Supply Security Policy

As Figure 2 contains one <wsp:All> tag, all the child assertions have to be satisfied. The policy has two nested assertions. The first assertion, surrounded by a <wsp:ExactlyOne> tag, has two nested assertions relating to the use security tokens. The second assertion is compulsory and requires the use of time stamps. The policy thus states with the <wsp:ExactlyOne> operator that either a Username Token or a X509Token must be used. A timestamp is always needed. The definition of policy alternatives is discussed next.

Policy Alternatives

WS-Policy allows the use of policy alternatives. Policy alternatives are the building blocks of combined security policies. By being able to specify alternatives in a policy, security policies become less static in nature as web services consumers are given a choice between security requirements of web services providers. With more, equally secure, sets of security requirements and capabilities, a web services provider will thus be able to interact with more diverse web services consumers.

Before policy alternatives can be compared with each other, the policy has to be in normal form to clarify the content of all alternatives. Normal form of policies is a standardized format where only one <wsp:ExactlyOne> operator is used. <wsp:All> tags are used to represent policy alternatives, which are nested in the
<wsp:ExactlyOne> tag. Figure 2 is converted into normal form, and shown in Figure 3. Each <wsp:All> tag contains a set of nested assertions There are two alternatives, the one requires the use of a Username Token and timestamp, and the other requires the use of a X.509 Certificate Token and timestamp.

```
<wsp:Policy>
<wsp:ExactlyOne>
<wsp:All>
<sp:X509Token>...</sp:X509Token>
<sp:IncludeTimestamp/>
</wsp:All>
<wsp:All>
<sp:UsernameToken>...</sp:UsernameToken>
<sp:IncludeTimestamp/>
</wsp:All>
</wsp:ExactlyOne>
</wsp:Policy>
```

Figure-3: Part of Web Supply's Security Policy in Normal Form.

WS-Policy provides the structure and rules of policy processing. If developers were to be given a free hand when designing security policies, much confusion will arise. To ensure that standard, usable security policies are defined, WS Security Policy is used.

D. WS-Security Policy

The WS-Security Policy defines a set of policy assertions that are used to define individual security requirements or constraints of a web service. It reuses the operator set defined in WS-Policy to create security policies that contain policy alternatives with nested security assertions. The range and structure of security aspects over which compatibility between the service consumer and provider must be reached is defined by these security specifications. ISO 7498-2 defines 5 main categories of security services namely authentication, access control, confidentiality, integrity and non-repudiation. The main focus of WS Security Policy is on authentication, confidentiality and integrity. Mechanisms for non-repudiation are not explicit, but can be applied with integrity and binding mechanisms. Access control is either left to the web services provider to implement, or can be defined with SAML or Kerberos Tokens. WS Security Policy incorporates WS-Security to define policies that can use weaker security mechanisms such as the transport security provided by HTTP, or much stronger security mechanisms such as a custom combination of XML signature and encryption. Administrators need to carefully evaluate chosen mechanisms and their combinations in order to determine the strength of security that is supported by a security policy. There are five main policy assertion types:

- Token assertions specify security tokens such as X509 certificates that provide public/private keys when a SOAP message is signed and encrypted.
- Security binding assertions define the way in which SOAP message exchanges are secured, such as the use of HTTPS transport protection when the Transport binding assertion is selected.
- Protection assertions specify which message parts are protected and how they are protected for selective signing and encryption of SOAP message parts.
- Supporting token assertions specify security tokens used to provide additional claims about a message sender such as security tokens used in authentication.
- Protocol assertions are used to specify predefined security requirements for SOAP message security and trust related options that SOAP message senders and receivers must both support. For example, the Wss10 assertion requires that the sender and receiver are able to process external URI references. The Token assertions and Security binding assertion are now further examined as they provide the foundation for a security policy. The Token Assertion is used to specify the types of tokens used for SOAP message protection such as Username Tokens, X509 Tokens, SAML Tokens and HTTPS Tokens. The second part of algorithm gives supported authentication tokens. If stronger authentication tokens are used, better identification and trust in the other party is possible.

The Security Binding Assertion defines the process used to secure SOAP message exchanges. Three binding assertions are defined by WS-Security Policy namely the Transport binding assertion, Asymmetric binding assertion and the Symmetric binding assertion. For Transport binding, SOAP message security point-to-point security is provided. The SOAP message sender and receiver have a restricted level of security as they may, for example, not be able to specify which message parts need to be signed, thereby lowering the level of security provided.

By applying message protection at the SOAP encoding layer instead of at the transport layer, more flexible security policies at finer level of granularity can be defined with Asymmetric Binding and Symmetric Binding for multi-tier architectures. These bindings use security tokens and keys to selectively sign and encrypt parts of SOAP messages to provide end-to-end security as messages moves across domains. This allows for flexible control over confidentiality and integrity that is not present in Transport binding. Symmetric binding is generally used in situations where only the web services provider has an X.509 certificate. A common security token is used for SOAP message exchange. A symmetric key is created and encrypted using the keys derived from the security token and used for all message encryption and signature operations. The symmetric key is encrypted using the public key of the web services provider and is sent with the SOAP message. If both parties possess X.509 certificates, Asymmetric binding is recommended. In Asymmetric binding two unique security tokens are used, provided by each party. The public-private key pairs used for signing and encryption are derived from X509 certificates or SAML tokens. The private keys are used to sign a SOAP message and the public keys are used to encrypt a SOAP message. For confidentiality and integrity, a sound collection of cryptographic algorithms, is defined by an algorithm suite, for performing operations such as signing, encryption, and generating message digests.

For example, Basic256, listed in the first row, incorporates the AES256 encryption algorithm, Sha1 hash function, KwAes256 key wrap algorithm for symmetric keys, KwRsaOaep key wrap algorithms for asymmetric keys, PSha1L256 encryption key derivation algorithm and PSha1L192 signature key derivation algorithm and 256 minimum key length. The choice of algorithm has an influence on the strength of message security. For example, the choice of digest influences the strength of integrity, and the choice of encryption algorithm has an influence on the strength of confidentiality. The key wrap algorithms influence strengths of both integrity and confidentiality. The strengths of encryption algorithms can be ordered from strongest to weakest as AES-256, AES-192, AES-128, and Triple-DES. Similarly, each of the columns can be ordered from strongest to weakest e.g. TripleDesSha256Rsa15 is the weakest algorithm suite. Finally, additional features such as Time Stamps and Message IDs can be used to further assist with non-repudiation and protect against replay attacks. The WS-Security Policy specification is complex and addresses a large variety of additional aspects not discussed here such as the order of encryption and hashing, and whether both the header and body of the message must be protected. Administrators need to carefully evaluate chosen mechanisms and their combinations in order to determine the strength of security that is supported by a security policy. When two policies are intersected, it would be important to ensure that the list of compatible alternatives provide a sufficient level of security to both the web service provider and consumer.

E. Policy Intersection

Policy intersection finds the matching alternatives of two policies by using an intersection algorithm. Policy intersection is a commutative and associative function that takes two policies as input and returns a policy containing the compatible alternatives. If two policy alternatives are compatible, their intersection is an alternative containing all of the assertions found in both alternatives. If the alternatives that are being combined do not agree on the same vocabulary, they are not added to the new policy. For example, if a web

service provider's security policy requires authentication with certificates and a consumer uses username-password combinations, no compatibility between the policies can be found. The intersection algorithm consists of two steps namely domain-independent policy intersection and domain-specific processing. The WS-Policy specification does not explain how domain-specific processing should be implemented. This is left to the individual or organization in charge of the domain specific processing. For domain-independent policy intersection, two policies in normal form, with a set of policy alternatives and their nested assertions have to be present. Policy intersection is implemented as follows. Policy alternatives from both policies are compared to each other using the following rules. If two policy assertions have the same type, they are compatible. The type of an assertion is specified by the Qualified Name (QName) property of an assertion. The QName is unique and identifies what an assertion does. For example, sp:Protection Token specify protection tokens that need to be present in a respective policy alternative. If an assertion has a nested policy with alternatives, it is only compatible with an assertion that has a nested policy with compatible assertions.

Once policy intersection has been applied to two policies, all compatible policy alternatives discovered during policy intersection are included in a new policy. For two incompatible policies, policy intersection will result in an empty policy with no matching assertions. The new policy can then be processed or used as necessary. To demonstrate policy intersection, an example is now examined.

```
<wsp:Policy>
<wsp:ExactlyOne>
---<wsp:All>
| <sp:SymmetricBinding> [1]
| <sp:ProtectionToken> [2]
| <sp:X509Token>...</sp:X509Token>
| </sp:ProtectionToken>
(A) <sp:AlgorithmSuite> [3]
| <sp:Basic192/>
| </sp:AlgorithmSuite>
| <sp:IncludeTimestamp/> [4]
| </sp:SymmetricBinding>
---</wsp:All>
---<wsp:All>
| <sp:TransportBinding> [5]
| <sp:ProtectionToken> [6]
| <sp:HttpsToken>...</sp:HttpsToken>
| </sp:ProtectionToken>
| <sp:AlgorithmSuite> [7]
(B) <sp:Basic256/>
| </sp:AlgorithmSuite>
| <sp:SupportingTokens> [8]
| <sp:UsernameToken/>
| </sp:SupportingTokens>
| </sp:TransportBinding>
---</wsp:All>
</wsp:ExactlyOne>
</wsp:Policy>
```

Figure-4: Web Supply's Security Policy in Normal Form

Figure 4 gives a simple security policy for the service provider, Web Supply. It extends the policy defined in Figure 3 with more features using WS-Security Policy syntax.

In this policy, the first policy alternative (A) requires the use of symmetric binding with timestamps. Basic192 is required as the algorithm suite from which the signing and encrypting algorithms are defined.

The second policy alternative (B) requires the use of transport level security provided by HTTPS. The Basic256 algorithm suite is required as well as a Username token to authenticate the sender of the message. These two options of varying strength and complexity provide web services consumers with a choice of security policy alternatives to choose from. The policy is in normal form, which means that it is ready for policy intersection. Figure 5 shows NewHitsMusic, a web services consumer's security policy. NewHitsMusic does not support a sophisticated platform and support more basic security mechanisms. A weaker security token namely Username token, with a weaker algorithm suite namely Basic128 is used over transport binding.

```
<wsp:Policy>
<wsp:ExactlyOne>
---<wsp:All>
| <sp:TransportBinding> [9]
| <sp:ProtectionToken> [10]
| <sp:HttpsToken>...</sp:HttpsToken>
| </sp:ProtectionToken>
| <sp:AlgorithmSuite> [11]
(C) <sp:Basic128/>
| </sp:AlgorithmSuite>
| <sp:SupportingTokens> [12]
| <sp:UsernameToken/>
| </sp:SupportingTokens>
| </sp:TransportBinding>
---</wsp:All>
</wsp:ExactlyOne>
</wsp:Policy>
```

Figure-5: New Hits Music Security Policy

New Hits Music determines whether it can support the security mechanisms of Web Supply by first performing policy intersection over the two policies defined in Figure 4 and Figure 5. Policy alternative B from the Web Supply security policy in Figure 4 and policy alternative C defined in the New Hits Music security policy from Figure 5 match as these alternatives have the same number and type of nested assertions. Assertions 5 to 8 from alternative B in Figure 4 match the assertions 9 to 12 from alternative C Figure 5. All of the matching assertions are included in a new security policy shown in Figure 6.

After policy intersection, the policy in Figure 6 contains duplicates and inconsistencies. In alternative D, assertions 15and 18 both specify an algorithm suite of different strengths.

There are also two duplicate Username token assertions.
This policy will confuse developers using it and it needs to be corrected with domain-specific processing.

```
<wsp:Policy>
<wsp:ExactlyOne>
---<wsp:All>
| <sp:TransportBinding> [13]
| <sp:ProtectionToken> [14]
| <sp:HttpsToken>...</sp:HttpsToken>
| </sp:ProtectionToken>
| <sp:AlgorithmSuite> [15]
| <sp:Basic256/>
| </sp:AlgorithmSuite>
| <sp:SupportingTokens> [16]
| <sp:UsernameToken/>
(D) </sp:SupportingTokens>
| <sp:ProtectionToken> [17]
| <sp:HttpsToken>...</sp:HttpsToken>
| </sp:ProtectionToken>
| <sp:AlgorithmSuite> [18]
| <sp:Basic128/>
| </sp:AlgorithmSuite>
| <sp:SupportingTokens> [19]
| <sp:UsernameToken/>
| </sp:SupportingTokens>
| </sp:TransportBinding>
---</wsp:All>
</wsp:ExactlyOne>
</wsp:Policy>
```

Figure-6: Web Supply and New Hits Music Intersected Security Policy

In the next section, policy intersection is evaluated to identify aspects that need to be addressed to ensure that a resultant policy does not lead to a less secure environment.

Policy Intersection Evaluation

Policy intersection is by itself not intended to create correct, useable security policies. WS-Policy intersection is solely focused on syntactic of alternatives and does not address the semantics of assertions, or their influences on each other. Subtle differences between assertions cannot be managed properly. There is also no guidance on how to address domain-specific processing in a standard manner.

Additional policy processing is required to correct policies after policy intersection, resulting in a two step policy intersection process. Also, as New Hits Music generally supports weaker security mechanisms, policy intersection ensures that the agreed upon policy includes these mechanisms, without considering how their interdependence will affect the strength of security supported by Web Supply.

To highlight the limitations of policy intersection, domain independent policy intersection, related influence of policy alternatives and assertions, and the influence of external factors on security policy intersection are now discussed.

A. Domain-Independent Policy Processing

The manner in which policy assertions are constructed and the absence of semantic matching of assertions are limitations that lead to inconsistent policies when policy intersection is performed.

B. Policy Inconsistencies

When security policies are intersected, the new security policy will contain all the matching assertions which can create semantic inconsistencies in the form of assertion duplication or contradicting assertions. For duplicate assertions, the policy intersection algorithm does not interpret if assertions have the same type and if so, whether the same underling mechanism is specified. If assertions are exactly the same, only one copy of the assertion should be placed in the new security policy. For contradicting assertions of the same type such as assertions 15 and 18 of alternative D in Figure 6 both specify an algorithm suite, but with different strength namely Basic128 and Basic256. The policy intersection algorithm cannot decide which one is best to use and an out-of-band discussions between administrators of the two environments is needed.

C. Assertion Incompatibility:

Policy intersection only considers assertions to be compatible if they share the same type. If two assertions are slightly different they will not match. Take for example the two assertions in figure 7, that are very similar. They both require that some form of a Figure 7. Two similar security assertions supporting token has to be used. The only difference is that the first assertion requires a time stamp to be used, while the second one does not. In policy intersection these assertions will not intersect. An intelligent intersection mechanism should be able to detect that semi-compatible assertions such as these are similar enough to be placed in a policy.

D. Assertion Parameters:

Attributes and child elements of assertions are completely ignored by policy intersection, thereby not detecting incompatibilities. WS-policy does not address how domain-specific policy processing should be implemented. The next sections highlight some considerations that need to be taken into account by domain-specific policy processing namely the related influence of security mechanisms and of external influences.

E. Related Influence of Security Mechanisms

Security policy alternatives and assertions specified in security policies are typically defined in isolation from each other. However, the usefulness of any mechanism often lies with the way in which it is combined with others. It is thus important for security policy administrators to view their security mechanisms in the context of the whole security system. It would also be important for security policy administrators to be able to evaluate alternative security mechanisms against each other to determine which will be the best for the given situation. This is even more important when policy intersection has been performed.

The security mechanisms used in a security policy alternative all contribute to the security level of a security policy. Stronger security mechanisms help to increase the security level while weaker security mechanisms lower the security level. To create an appropriate security policy alternative, a mix of stronger and weaker security mechanisms can be used to reach a certain security level. For example, in Figure 4, Web Supply uses transport binding with a Username token, but requires a strong algorithm suite to protect messages. Unfortunately, policy intersection does not consider the contribution that each security mechanism makes towards reaching a specific security level. The security level or security goal of a web service is directly affected by integrity, confidentiality and authentication

mechanisms used. This research considers the related effects that security mechanisms and policy assertions for these security services may have on each other and on the security level of the organization

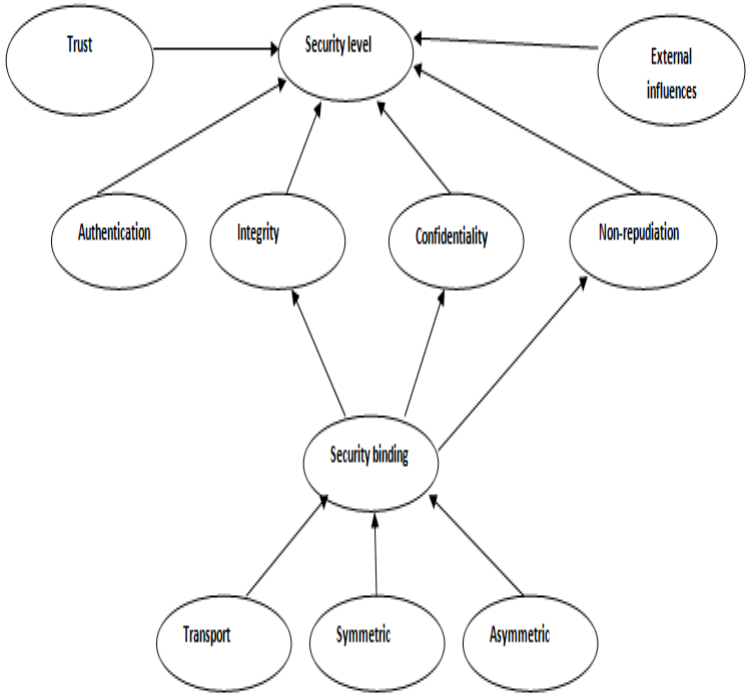

Figure 8: Security Policy Model

Authentication is an important security service to implement. If a web services consumer cannot be properly identified, the web services provider will not provide services to the web services consumer. Because of this, authentication has a strong influence on the security level. The security mechanisms used for authentication must therefore carefully be selected and protected. Authentication has a direct influence on the trust relationship with the other party. On the other hand, if there is high trust in the other party, the weaker authentication tokens may be used. With low trust between two parties, stronger forms of authentication tokens have to be used to strongly identify each party to each other.

An important influence on integrity and confidentiality is the security binding, as it defines a set of properties that together give coherent information on how to secure a given message exchange. For example, one can stipulate that an asymmetric token is used with a digital signature to provide integrity protection, and parts of a message are encrypted with a symmetric key which is then encrypted using the public key of the recipient. The security binding restricts what can be placed in the security header of a message and the associated processing rules. A decrease in either of the strength of confidentiality and integrity mechanisms will negatively influence the security binding. The security binding is also influenced by the choice of algorithm suite, the binding type and the use of timestamps. By using a strong algorithm suite, the security level supported by the security binding will be improved as it ensures a sound combination of security mechanisms for integrity and confidentiality. The type of binding such as Asymmetric binding can ensure more fine-grained message security, as parts of a message can be protected as it moves across domains. If Transport binding, is used, HTTPS and not SOAP security is applied,

providing point-to-point protection, of lesser strength. Including timestamps strengthens integrity, confidentiality and provides non-repudiation evidence. Current policy intersection processing does not address any of these complexities. In the next section, the external influences to policy intersection are discussed.

E. External Influences

Computing environments supporting web services applications are becoming more complex and diverse, as complicated network topologies using firewalls, intrusion detection systems and intermediate proxy servers are created. If an organization's environmental scanners detect a heightened number of attacks on the organization's systems, it would require of consumers to use better confidentiality and integrity mechanisms to counter this danger. The selection of policy alternatives thus dictates a profound understanding of the complexities of the environment and their influences on each other. External influences are specific to the web service provider or consumer environment, and influence the choice of policy alternatives directly. For example, vulnerabilities scanners or firewalls, metrics collected when security mechanisms are used, and trust mangers that monitor the trust level between the negotiating parties can be considered. These influences differ according to the circumstances and preferences of each provider or consumer. For example, a SME may have very different security preferences, influences on its security level, and security goals than a large enterprise.

Security Policy Framework

Currently, security policy intersection is very limited. Compatible security policies may present risks to organizations as the combination of security alternatives may include inconsistencies and errors. In order to comprehensively consider all important aspect when security policies are intersected, a first step towards a security policy model is presented in Figure 8. It presents a high-level view of the relationships between the different aspects that were discussed. Figure 8 indicates which security mechanisms and policy assertions influence each other. The security mechanisms, such as specific algorithms resort under each respective component. When policy intersection is performed, a trade-off analysis is required between policy assertions in compatible security policies to ensure that the best set of policy assertions to use.

There are a number of steps required in this process.

1. Identify the security preferences of the environment as well as security mechanisms that have been implemented.
2. Assign a weight to each security mechanism to be able to determine which are preferable to use.
3. Determine a security goal that a security policy should support.
4. Once issues have been identified, decision-making mechanisms must be employed to understand the impact of choices and resolve disputes. Use intelligent decision making to select the best policy alternatives. The very nature of such decisions is a fuzzy and uncertain process that is domain and context dependent. In a cooperative process of negotiation, consumers and providers are more likely to be satisfied with the final result if they participated in reaching the result by way of compromises and trade-offs.

Conclusion

In this paper, the need to find mutually compatible security policies was identified. Web services security policy specifications were discussed using an example. The policy intersection algorithm provided by WS-Policy was analyzed and a number of weaknesses associated with security policy intersection were identified. An important contribution made was the discussion the inter-related effect that the selection of security mechanisms has on each other, and on the security level supported by the security policy. The focus of future research is to design a tool to support the features that were identified by this research. It will be of great assistance to administrators to have a graphical interface to view the influences that security policy selection has on the security level supported by the policy in conjunction with external influences.

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A STUDY ON E-COMMERCE AND ITS SECURITY: ISSUES AND CHALLENGES

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Abstract
The present paper explains to empower a safe e-commerce communication between web administrations, it is fundamental to arrange a typical security approach by registering the strategy convergence as indicated by the web administration (WS)- strategy structure.it also incorporate producing interest for products and ventures, offering deals backing and client administration, or encouraging correspondences between business partners.One of the basic achievement elements of web based business is its security.
Keywords: E-Commerce, Security Issues.

Introduction

Web based business is purchasing and selling products and enterprises over the Internet. Web based business is a piece of e-business as determined in. E-business is a structure that incorporates not just those exchanges that middle on purchasing and pitching merchandise and enterprises to create income, yet additionally those exchanges that help income age. These exercises incorporate producing interest for products and ventures, offering deals backing and client administration, or encouraging correspondences between business partners.One of the basic achievement elements of web based business is its security. Without the affirmation of security, online business may not work regularly. Also, it is an unpredictability issue, in light of the fact that internet business security identifies with the certainty among dealers and purchasers, charge card and very touchy individual data. In this way, the security of web based business relies upon a mind boggling interrelationship among applications stages, database the board frameworks, programming and system foundation, etc. Any single shortcoming can imperil the online business security.

Security is critical in web based shopping locales. Presently days, a colossal sum is being obtained on the web, in light of the fact that it,,s simpler and progressively helpful. Nearly anything can be purchased, for example, music, toys dress, autos, sustenance and even pornography. Despite the fact that a portion of these buys are illicit we will concentrate on all the item,,s you can purchase lawfully on the web. A portion of the prominent sites are eBay, iTunes, Amazon, HMV, Mercantila, dell, Best Buy and considerably more.

Security Issues of Electronical Commerce

The quick improvement of Internet has advanced electronic trade blast. Be that as it may, in the meantime, the web organizations have brought substantial security issues, for example, International Journal of Security and Its Applications And with the advancement of electronic business, these issues have acquired an ever increasing number of considerations.

Shared Trust in Business

In the customary trade, member can vis-à-vis, so there might be little doubt. Be that as it may, there is contrast in electronic business. For instance, in electronic trade, the area of the business and the merchandise are obscure. Progressively vital, there isn't close to home

contact between the vender and the purchaser. Moreover, there is absence of an unmistakable legitimate structure in electronic trade. Thusly, how to improve common trust is a critical issue.

Protected Innovation

Intellectual Property dangers are a bigger issues than they were before the wide spread utilization of the web .It is moderately simple to utilize existing, material found on the web without the owner‟s Permission. Genuine money related harm coming about because of a copyright infringement is more hard to measures than harm from mystery, honesty, or need PC security infringement.

Assaults

This part depicts potential security assault ways from an assaulter or programmer.

Tricking the buyer: Some of the easiest and most beneficial assaults are upheld deceiving the customer, also alluded to as social designing techniques. These assaults hold reconnaissance of the customer's conduct, gathering information to use against the buyer. For instance, a mother's last name might be a typical test question used by shifted destinations. In the event that one in everything about destinations is deceived into giving uninhibitedly a secret word once the test question is given, at that point not just has this site been give and take, anyway it is also likely that the customer utilized indistinguishable logon ID and secret word on elective locales.

Inquiring the buyer's PC: Lacks of PCs are extra to the web month to month. Most clients' information of security vulnerabilities of their frameworks is uncertain at the best. What's more, code and equipment merchants, in their mission to ensure that their stock are easy to put in, can deliver stock with security highlights impaired. As a rule, empowering security includes needs a non-specialized client to examine manuals composed for the designer. The befuddled client doesn't plan to adjust the wellbeing alternatives. This makes a fortune for aggressors.

Sniffing the system: In this subject, the assailant screens the data between the customer's PC and along these lines the server. He gathers data concerning the customer or takes individual data, similar to ace card numbers. There are focuses inside the system wherever this assault is extra reasonable than others.

Guessing passwords: General assault is to figure a client's mystery word. This assortment of assault is manual or programmed. Manual assaults are toilsome, and just independent if the assailant knows about one thing concerning the buyer. For instance, if the buyer utilizes their tyke's name on the grounds that the secret key. Programmed assaults have a superior likelihood of accomplishment, because of the probability of theory a client ID/secret key turns into a ton of imperative in light of the fact that the scope of attempts will increment. Instruments exist that utilization every one of the words inside the vocabulary to check client ID/secret word blends, or that assault far reaching client ID/secret key blends. The aggressors will automatism to go against various destinations at just once.

Mistreatment disavowal of administration assaults: The forswearing of administration assault is one among the most straightforward examples of affecting site comfort. It

includes accomplishing the server to play out an outsized assortment of commonplace assignments, immense the capacity of the server to address the other undertaking.

Arrangements

Education: Your framework is similarly as secure on the grounds that the people that utilization it. In the event that a customer picks a frail secret key, or does not remain their secret key mystery, at that point an assailant will make as that client. This can be critical if the bargained secret key be in the correct spots to a boss of the framework.

Personal firewalls: When interfacing your PC to a system, it moves toward becoming in danger of assault. A private firewall safeguards your pc by restricting the classes of traffic started by and coordinated to your PC. The intruder additionally can check the hard drive to see any hang on passwords.

Secure Socket Layer: Secure Socket Layer could be a convention that encodes data between the customer's PC and furthermore the site's server. When a Secure Socket Layer ensured page is mentioned, the program recognizes the server as a trusty element and starts an affirmation to pass coding key information forward and backward. Presently, on resultant solicitations to the server, the information streaming forward and backward is scrambled so a programmer sniffing the system can't peruse the substance.

Server firewalls: A firewall is much the same as the channel incorporating a manor. It guarantees that solicitations will just enter the framework from, for example, ports, and at times, guarantees that each one gets to are just from bound physical machines.

intrusion location and audits of security logs: One of the foundations of a proficient security methodology is to stop assaults and to watch potential aggressors. This sees the character of the framework's traffic, or as a spot to start for lawful continuing against the aggressors.

Review of Literature

Patric Barwise(2001); Electronic trade, as a rule called web based business or e-business comprises of the looking for and trade of item or administrations over electronic frameworks like the web and distinctive PC systems. The quantity of exchange led electronically has full-developed awfully with across the board web use. Amid the web based business strategy urgent business exchanges are conveyed. Indeed, even individuals perform on-line exchanges like ebanking and looking and so on over the web. It is here that the specific danger grasps the brain of every individual who is that the information passed on Infobahn is secure? While safety efforts don't affirmation a protected framework, they are required to make a safe framework. This paper shows a rundown of security and protection issues identified with internet business and furthermore the conceivable answers for them.

Nir B. Kshetri (2001); In 21st Century in which we as a whole are living innovation is turned into a need and in this way, its application in business and trade are not a matter of decision but rather a matter of impulse. This is the reason the worldwide challenge could be looked with the five fundamental segments in particular quality, cost, comfort, correspondence and time could be feasible in the event that we make exchanges

electronically. These five aspects are additionally of principal centrality when we need to confront firm and throat cutting challenge. The seeds of the patterns, issues and difficulties currently grabbing hold in Ecommerce and portable trade were mixed or infused into business amid early days, some time before the shakeout started. Today, as the residue settles, are those patterns, issues and difficulties have come up to show unmistakably toward the fate of Ecommerce changing into Mobile Commerce. The rising patterns, issues and difficulties in Ecommerce incorporate multi-channel retailing; progressively fulfilled clients; clients doing own things; missing out the fair size E-rear; losing human relations; and more benefits. The rising economies known as BRICS nations to be specific Brazil; Russia; India; China and South Africa have turned out with online shippers staggering development potential and openings, yet additionally challenges when it come to creating explicit nearby installment plans.

Elizabeth Goldsmith and Sue L.T. McGregor(2000); — With the development of the Global Economy, and with a regularly expanding level of customers doing their business basically by means of on the web or cell phones, electronic trade, internet business, is quick being viewed as the best approach worldwide at the dash of a catch. Thus, building up a successful E-Commerce show is getting to be crucial for any cutting edge business. Be that as it may, an organization must address diverse new security challenges and be sure to keep up the most noteworthy guidelines of internet business security, to ensure both themselves and their clients. An inability to hold fast to stringent online business security can result in lost information, traded off exchange data, just as the arrival of the client's money related information. This can prompt lawful and monetary risk, just as a negative effect on the organization's notoriety. This new security challenges are the consequences of the utilization of the new innovation and correspondence medium, and the stream of data from big business to big business, from big business to customers, and furthermore inside the venture. This paper shows the distinctive innovation and applied segments of the web based business as a rule, and recognizes and characterizes the diverse kinds of security challenges confronting web based business organizations specifically.

Zabihollah Rezaee, Kenneth R. Lambert and W. Ken Harmon(2006); E-Commerce alludes to the trading of products and ventures over the Internet. The shopping through online business has infiltrated all portions of products running from perishables to electronic merchandise and even vehicles. Quick development in portable figuring and correspondence innovations has encouraged notoriety of online business. The fundamental obstruction in development of web based business is cyberfraud and fraud. Programmers are individuals who do the cybercrime. Consequently, poor security on internet business web servers and in clients PCs is center issue to be settled for fast development of online business. This paper gives bearings to web based business security in order to improve client trust in internet business shopping.

Conclusion

Online business acquaints with the exchange of items and administrations over the web. All significant retail marks have a web nearness, and heaps of brands haven't any related blocks and mortar nearness. Be that as it may, web based business furthermore applies to business to business exchanges, for instance, among producers and providers or wholesalers. Online business frameworks are pertinent for the administrations exchange. For instance, on-line banking and business administrations empower clients to recover

bank proclamations on-line, exchange reserves, pay MasterCard bills, apply for and get endorsement for a substitution contract, get and sell securities, and get cash steerage and information. Electronic trade that is directed between organizations is referenced as business-to-business or B2B. B2B are frequently affable every invested individual (for example exchange merchandise trade) or limited to specific, pre-qualified members (individual electronic market). Electronic trade that is led among organizations and clients, on the contrary hand, is referenced as business-to-shopper or B2C. This is regularly the sort of electronic business directed by compacts like, flip truck, Amazon.com. On-line looking for could be a kind of electronic trade wherever the client is straightforwardly on-line to the seller's PC for the most part utilizing the web. There is no between arbiter administration. The deal and purchase dealings are finished electronically and intuitively in timeframe like Amazon.com for fresh out of the box new books. On the off chance that an intermediates is blessing, at that point the deal and purchase dealings is named electronic business like eBay.com.

Online Business Security Tools

- Firewall – Software and Hardware
- Public Key framework
- Encryption programming
- Digital declarations
- Digital Signatures
- Passwords
- Locks and bars – arrange activities focus

Reason for Study

- Study the Overview of E-business security.
- Understand the Online Shopping - Steps to put in a request
- Understand the reason for Security in E-business.
- Discuss the distinctive security issues in E-business.
- Understand the Secure web based shopping rules

Web based business is generally viewed as the purchasing and selling of items over the web, yet any exchange that is finished exclusively through electronic measures can be viewed as online business. Step by step E-business and M trade assuming great job in online retail advertising and people groups utilizing this innovation step by step expanding everywhere throughout the world. Web based business security is the insurance of web based business resources from unapproved get to, use, change, or annihilation. Measurements of online business security; Integrity: anticipation against unapproved information change, No renouncement: counteractive action against any one gathering from reneging on an understanding sometime later. Realness: confirmation of information source. Secrecy: insurance against unapproved information divulgence. Protection: arrangement of information control and divulgence. Accessibility: avoidance against information postponements or expulsion.

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IMPORTANCE OF BACK PROPAGATION NEURAL NETWORK

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ABSTRACT
A mainstream and straightforward NN way to deal with the OCR issue depends on feed forward neural systems with back proliferation learning. The fundamental thought is that we first need to prepare a preparation set and afterward train a neural system to perceive patterns from the preparation set. At the preparation arrange, organize is made to figure out how to react to a predetermined contribution with the ideal yield.
The representation of each preparation test is finished by two segments i.e the conceivable info and the ideal yield given that system's information. After the preparation step is done, we can give a subjective contribution to the system and the system will shape a yield, from which we can resolve an example type presented to the system.
The objective of any regulated learning algorithmic standard is to pursuit out of work that best maps an accumulation of contributions to its right yield. A model would be a simple order task, any place the information is an image of a creature, and furthermore the right yield would be the name of the creature. Some info and yield patterns are frequently essentially learned by single-layer neural systems (for example perceptrons).

KEYWORDS:
Back, Propagation, Neural, system

INTRODUCTION
A multi-layered system beats this constraint since it will deliver inner representations and adapt totally various alternatives in each layer the essential layer is additionally liable for learning the directions of lines abuse the contributions from the individual pixels inside the image. The second layer could blend the alternatives learned inside the first layer and figure out how to spot simple shapes like circles. Each higher layer learns a great deal of and a ton of theoretical alternatives like those referenced higher than that might be acclimated characterize the image. Each layer discovers patterns inside the layer underneath it and it's this capacity to make inner representations that square measure independent of out of entryways input that offers multi-layered systems their capacity. The objective and inspiration for building up the back spread algorithmic guideline was to hunt out some approach to mentor a multi-layered neural system such it will become familiar with the appropriate inward representations to allow it to be advised any discretional mapping of contribution to yield.
As the calculation's name suggests, the blunders proliferate in reverse from the yield hubs to the information hubs. Actually, back spread figures the inclination of the mistake of the system concerning the system's modifiable loads. This slope is almost always utilized in a simple arbitrary angle plummet algorithmic guideline to hunt out loads that limit the blunder. Ordinarily the expression "back proliferation" is utilized amid a ton of general sense, to consult with the total strategy including each the estimation of the angle and its

utilization in irregular inclination plummet. Back engendering once in a while allows quick combination on palatable local minima for blunder inside the sensibly systems to that it's fit. Back spread systems square measure basically multilayer perceptrons (for the most part with one information, one covered up, and one yield layer).

So as far the shrouded layer to serve any accommodating work, multilayer systems ought to have non-linear actuation capacities for the various layers: a multilayer arrange abuse exclusively linear enactment capacities is respect some single layer, linear system. Non-linear initiation works that square measure usually utilized encapsulate the arrangement work, the delicate max work, and furthermore the Gaussian work.

Notwithstanding, these single-layer perceptrons can't become familiar with some similarly simple patterns, similar to individuals who aren't linearly dissociable. for example, an individual's could group an image of a creature by perceiving beyond any doubt alternatives like the amount of appendages, the vibe of the skin (regardless of whether it's furred, feathered, scaled, and so on.), the size of the creature, and furthermore the rundown goes on. A solitary layer neural system in any case, ought to learn work that yields a name solely misuse the power of the pixels inside the image. There are no methods for it to be told any conceptual alternatives of the contribution since it's limited to having just 1 layer.

IMPORTANCE OF BACK PROPAGATION NEURAL NETWORK

The back proliferation algorithmic principle for wise an angle has been rediscovered assortment of times, and could be an extraordinary instance of a great deal of general method known as programmed separation inside the turn around aggregation mode. Regular confinement of BPNN square measure as pursue: The outcome could meet to a region least. The "slope climbing" procedure of inclination plunge is supreme to work if there's just 1 least.

In any case, regularly the mistake surface has a few local minima and maxima. In the event that the spot to start of the slope plunge happens to be somewhere close to a territory most and local least, at that point occurring the bearing with the preeminent negative inclination can result in the local least.

Second the assembly in back spread learning isn't fortified. What's more, inevitably the assembly acquired from back proliferation learning is fantastically moderate. The observation algorithmic principle was anecdotal in 1957 at the Cornell material science Laboratory by Frank Rosenblatt supported by the US work environment of military administration investigation.

The discernment should be a machine, rather than a program, and though its first usage was in programming system for the IBM 704, it had been after upheld in custom equipment on the grounds that the "Imprint one perceptron". The beginning of the machine was accomplished for image recognition: it had a variety of four hundred photocells, discretionarily associated with the "neurons". Potentiometers are utilized to encode the Weights, and according to the prerequisite weight refreshes all through learning were performed by electrical engines.

In a 1958 gathering composed by the United States Navy, Rosenblatt made articulations concerning the perceptron that caused a warmed question among the juvenile AI people group; bolstered Rosenblatt's announcements, New York Times concurring the perceptron to be "the fetus of a processing gadget that [the Navy] expects will be ready to walk, talk, see, compose, imitate itself and be aware of its reality. In spite of the fact that the perceptron at first seemed promising, it had been immediately demonstrated that perceptrons couldn't be prepared to perceive a few classifications of patterns. This diode to

the circle of neural system investigation stagnating for quite a long while, before it had been perceived that a feed forward neural system with 2 or a ton of layers (otherwise called a multilayer perceptron) had so a lot bigger procedure control than perceptrons with one layer (otherwise called one layer perceptron)Single layer perceptrons square measure exclusively fit for adapting linearly dissociable patterns; in 1969 a commended book entitled Perceptrons by Marvin demonstrated that it had been unrealistic for these classes of system to be told a XOR work.

It's normally trusted that they conjointly guessed (erroneously) that a similar outcome would hold for a multi-layer perceptron organize. Be that as it may, this is regularly not valid, as every effectively accepted that multi-layer perceptrons were utilized for tackling a XOR work issue.

The perceptron could be a linear classifier, in this way it'll ne'er get to the state with all the information vectors grouped appropriately if the instructing set D isn't linearly dissociable, for example in the event that the positive models can't be isolated from the negative precedents by a hyper plane. Amid this case, no "rough" goals will be a little bit at a time drew closer underneath the quality learning algorithmic standard, anyway rather learning can bomb completely. Henceforth, if linear disconnectedness of the instructing set isn't known from the earlier, one in everything about training variations underneath should be utilized. Be that as it may, in the event that the training set is linearly dissociable, at that point the perceptron is outright to join, a bound on the amount of times the perceptron can change its loads all through the instructing.

While the perceptron algorithmic guideline is total to combine on some goals inside the instance of a linearly dissociable training set, still pick any goals and issues may concede a few arrangements of shifted quality. The perceptron of ideal steadiness, today higher called the linear help vector machine, was intended to determine this drawback. The choice limit of a perceptron is invariant concerning scaling of the heap vector; that's, a perceptron prepared with starting weight vector and learning rate \alpha \, carries on indistinguishably from a perceptron prepared with introductory weight vector and learning rate one. In this manner, since the underlying loads become unrelated with expanding assortment of emphases, the preparation rate doesn't make a difference inside the instance of the perceptron and is here and there basically set to one.

Back proliferation is related with in reverse spread of mistakes is a typical procedure of fake neural systems like slope plummet. This ascertains the slope of a misfortune work concerning all or any the loads inside the system. The slope is bolstered to the improvement technique that progressively utilizes it to refresh the loads, with an end goal to lessen the misfortune work. Back spread needs a best-known, wanted yield for each information in order to figure the misfortune work angle. It is regularly a directed learning system; despite the fact that can be utilized for some unsupervised learning procedures .It is a speculation of the delta principle to multi-layered feed forward systems, to proficiently ascertain the angles for each layer. Back engendering needs that the enactment works utilized by the unbelievable neurons or hubs are separated.

DISCUSSION

The back propagation learning algorithm is in two phases:

Phase 1: Propagation

1. In forward propagation of a training pattern's the neural network used to generate the output activations.

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2. In backward propagation of the output activations the neural network using the training pattern target used to generate the deltas of all output and hidden neurons.

Phase 2: Weight update

1. Multiply its output data and input activation to get the gradient of the weight and its weight update.
2. Far more subtract a ratio of the gradient from the weight.

The basic structure of BPNN consists of three layers: Input, Output & Hidden layer. The model of BP neural network is shown.

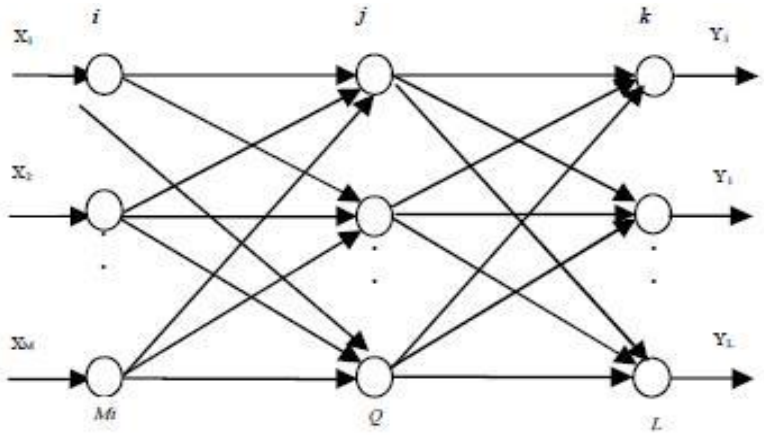

Fig 1: BP Neural Network Model

The input layer of network has M neurons, hidden layer Q neuron and the output layer has L neurons. The input vector of neural network is $X = [x1, x2, \ldots, xM]$ and the output vector of neural network is $Y = [y1\ y2 \ldots y L]$ .The weighted value between input layer and hidden layer is $w ij$ and the weighted value between hidden layer and output layer is the transfer function of neural network is uni-polar sigmoid function which is:

$$f(x) = \frac{1}{1 + e^{-x}}$$

The function has the Characteristic which is:

$$f'(x) = f(x)[1 - f(x)]$$

In accordance with the gradient descent method, the data transmits from the input layer to hidden layer which is $i = x i$. After the hidden layer receives the data from input layer, the first thing we should do is weighted sum which is:

$$net\ j = \sum_{i=1}^{M} w_{ij} x_i$$

And then transfer the data to the output layer through the transfer function. The output comes out with hidden layer is:

$$O\ j = f(net\ j) = f(\sum_{i=1}^{M} w_{ij} x_i)$$

- ***Example of NN Font learning using Bitmaps***

For example, let's assumes that we want to train a network to recognize 26 capital letters, represented as images of 16x16 pixels. One of the most obvious ways to convert an image to an input part of a training sample is to create a vector of size 256 (for our case), containing a "1" in all positions corresponding to the letter pixels and "0" in all positions corresponding to the background pixels . Most of the neural networks prefers to represent training patterns in „bipolar" way. The input vectors are placed "0.5" in place of "1" and "-0.5" instead of "0". Learning performance can be improved with such type of pattern coding.

All samples from the training set are presented to the network and the summary squared error is calculated, at every learning epoch. When the error becomes less than the specified error limit then it means that training is complete and it can be used for recognition.

- ***Example of NN Font learning using Feature-based Classifiers***

The approach described above works fine, but is limited in its extensibility. There are some issues that a generalized, robust NN-based handwritten character recognition system needs to handle, which include font and scale variations.

CONCLUSION

Giving an NN system bitmaps as input is somewhat problematic since humans don't see characters at the pixel level, nor is the "essence" of a character font conveyed by this panelized representation. When there are considerable bitmap variations in the definition of each font character, a better set of inputs to represent the data would be a set of classifiers, computable from the bitmap images, such that these classifiers are invariant to changes in font and point size. Some topological characters such as Euler number, compactness and geometric properties are in included in classifiers. The images given as impure computed and given as input to the NN system.

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Common fixed point in Metric space

Dr. Abhilasha S. Magar

AIM- Some fixed point theorem we shall prove A fixed point for continuous densifying mapping. We have also referenced some important results given in reference.

Keywords- Some fixed points theorems for mapping and γ on metric space on X and we can say about it which are not necessarily continuous and also satisfy a condition of the type-

$\text{Min} \{ (d(\gamma_x, \gamma_v))^2 , d(x,y) , d(\gamma_x, \gamma_v) , (d(\gamma, \gamma_y))^2 \} - \text{Min} [d(x, \gamma_x) d(y, \gamma_y) , d(x, \gamma_v) , d(y, \gamma_x)] \leq \eta\, d(x, \gamma_x) . d(y, \gamma_y)$

$\forall$ all $x,y \in X$ and for some $\eta \in (0, 1)$.

Now we are required to introduce some notion for densifying mapping.

To assume,

Let (x, d) be a metric space and γ be a mapping of X into itself. So we say about γ, it is called densifying, if for every bounded subset B of X with $\rho(B) > 0$, we can write

$\rho \{ \gamma (B) \} < \rho(B)$

and here we can say ρ is the measure of non-compactness of B

Now we have to prove theorem given below,

Theorem- Let γ be a continuous densifying mapping of a bounded complete metric space (x, d) into itself.

If for every x, y in X, we can say $x \neq y$, $x \neq \gamma_x$, $y \neq \gamma_y$, so that

$\text{Min} \{ [(d(\gamma_x, \gamma_y))^2 , d(x,y) , d(\gamma_x, \gamma_y) , (d(y, \gamma_y))^2] - \text{Min} [d(x, \gamma_x) , d(y, \gamma_y) , d(x, \gamma_v) , d(y, \gamma_x)] \} < (a\, d(x, \gamma_x) , d(y, \gamma_v) + b\, d(x, \gamma_v) , d(y, \gamma_x) + c\, d(xy), d(\gamma_x, \gamma_y)$ ----- 1

where a, b, c are numbers and we can a+c = 1, then γhas a fixed point.

Let x_0 be the point of X and we can consider the sequence

$x_0 , x_1 = \gamma(x_0) \ldots\ldots , x_{n+1} = \gamma(x_n) \ldots\ldots\ldots$

Now we can take

$\beta = \{ x_0 , x_1 , \ldots\ldots\ldots, x_n , \ldots\ldots \}$

Then $\lambda(\beta) \subset \beta$ we can say by continuity of λ we have $\lambda(\bar{\beta}) \subset \overline{(\lambda\beta)} \subset \bar{\beta}$

Hence, $\bar{\beta}$ is invariant under T and is bounded.

Now can suppose,

$\rho(\beta)$ is positive or $\rho(\beta) > 0$

since, we have

$\beta = \lambda(\beta) \cup \{ x_0 \}$ we can also say we have

$\rho(\beta) = \text{Max} \{ \alpha (T(A)) , \rho(x_0) \}$

$= \alpha (T(A))$

We know that the mapping λ is densifying so $\rho(\beta) = 0$ …….. (*)

Accordingly, we can say β is pre compact.

Since x is complete matrix space, $\bar{\beta}$ is compact.

So, we can say by hypothesis $d(x, \gamma_x)$ is continuous on the compact subset $\bar{\lambda}$

Hence, $d(x, \gamma_x)$ has a minimum.

Point n in $\emptyset\beta$. To prove that n or γ_n is a fixed point of λ.

Now we can go by reverse. Suppose $n \neq \gamma_n$ and $\gamma_n \neq \gamma_n^2$ then we have.

$\text{Min} [d(\gamma_n, \gamma^2_n)^2 , d(n, \gamma_n) d(\gamma_n, \gamma^2_n) , (d(\gamma_n, \gamma^2_n))^2] - \text{Min} [d(n, \gamma_n) d(\gamma_n, \gamma^2_n) , d(n, \gamma^2_n) d(\gamma_n, \gamma_n)] < ad(n, \gamma_n) d(\gamma_n, \gamma^2_n) + bd(n, \gamma^2_n) d(\gamma_n, \gamma_n) + cd(n, \gamma_n) d(\gamma_n, \gamma^2_n)$.

$\Rightarrow$ Min [d $(\gamma_n, \gamma^2_n)^2$, d (n, γ_n) d (γ_n, γ^2_n) - Min [d (n, γ_n), d (γ_n, γ^2_n), 0] from (*)
< (a+c) [d (n, γ_n), d (γ_n, γ^2_n)] …….. (2)
From (1) and (2).
We get d (n, γ_n) d (γ_n, γ^2_n) < d (n, γ_n) d (γ_n, γ^2_n)
Since a+c=1
which not applicable, does not hold.
Therefore d (γ_n, γ^2_n) < (a+c) d (γ, γ_n) = d (n, γ_n)
Which gives contradiction to our assumption of statement. Therefore, n or γ_n is a fixed point of γ. Now, we can say that this completes the proof of the theorem.

Corollary- Suppose γbe a fixed point mapping of a compact metric space (x, d) into itself.
If we can say for some x, y in X have x $\neq$ y, x $\neq$ γ_x, y $\neq\gamma_y$
Min[{ d (γ_x, γ_y) }^{2} , d(x , y) , d(γ_x, γ_y) . { d (y, γ_y)}^{2}] – Min [d (x, γ_x), d (y, γ_y),
d (x, γ_y) . d (y, γ_y)] < ad (x, γ_x) d (y, γ_y) + bd (x, γ_y) d(y, γ_x) + cd (x,y), d (γ_x, γ_y)
Here a, b, c are numbers and a+c=1, Then γ has a fixed point.
This corollary is useful for this theorem.
Corollary follows from the proof of the theorem.

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Factors Affecting Consumer Buying Behaviour

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Abstract: In Present Marketing Scenario, the Study of Consumer Behavior has become essential. Consumers are the kings of markets. Without consumers no business organization can run. All the activities of the business concerns end with consumers and consumer satisfaction. Customer behavior study is based on consumer buying behavior, with the customer playing the three distinct roles of user, payer and buyer. Consumer buying behaviour has become an integral part of strategic market planning. In order to develop a framework for the study consumer behaviour it is helpful to begin by considering the factors which impacts on consumer buying behaviour as well as the evolution of the field of consumer research and the different paradigms of thought that have influenced the discipline.

As described in this article, a set of dimensions can be identified in the literature, which can be used to characterize and differentiate, the various perspectives on consumer research.

The objective of the research endeavour is to achieve a better understanding of consumer behaviour with the factors influence consumer buying processes. This article aims to identify different streams of thought that could guide future consumer research.

Keywords: Consumer Buying Behaviour, Traditional Perspectives, Rational Perspectives, Cognitive, Traits.

Introduction:-

Consumer behaviour has been always of great interest to marketers. The knowledge of consumer behavior helps the marketer to understand how consumers think, feel and select from alternatives like products, brands and the like and how the consumers are influenced by their environment, the reference groups, family, and salespersons and so on. A consumer‟s buying behavior is influenced by cultural, social, personal and psychological factors. Most of these factors are uncontrollable and beyond the hands of marketers but they have to be considered while trying to understand the complex behavior of the consumers. Simple observation provides limited insight into the complex nature of consumer choice and researchers have increasingly sought the more sophisticated concepts and methods of investigation provided by behavioural sciences in order to understand, predict, and possibly control consumer behaviour more effectively. This Research Paper describes, the importance of various factors including lifestyle and its impact on the consumer buying behavior.The main purpose of this article is to identify different streams of thought that could help and guide for future consumer researchers.

There are many factors affecting consumer behaviour. These all factors jointly shape consumer behaviour. Due to impact of various factors, consumers react or respond to marketing programme differently. For the same product, price, promotion, and distribution, their responses differ significantly. The factors do not affect equally to all the buyers; they have varying effect on their behaviour. However, some factors are more effective, while others have negligible effect on consumer behaviour.

(A) Cultural Factors:

Cultural factors have the broadest and deepest impact on consumer behaviour. This set of factors mainly includes broad culture, sub-culture, and culture of social classes.

1. Broad Culture:

Culture is a powerful and dominant determinant of personal needs and wants. Culture can be broadly defined as: The way of living, way of doing, and way of worshiping. Culture determines the total patter of life. Culture has a tremendous effect on needs and preference. People react according to the culture to which they belong.

Every culture has its values, customs, traditions, and beliefs, which determine needs, preference, and overall behaviour. The child acquires a set of values, perception, attitudes, interest, preference, and behaviour from family and other key social institutions that control his/her behaviour. Every member is bound to follow cultural values to which he belongs. These cultural factors determine the way of reacting toward product and marketing strategies.

Culture is reflected in terms of followings:

: i. Family life/social system
ii. Role of women
iii. Woman education
iv. Approach to work and leisure
v. Approach to life
vi. Ethics in economic dealings
vii. Residence pattern
viii. Geographic factors
ix. Impact of other cultures, and so on.

These all factors affect what, when, where, how much, from whom, and how many times the product should be purchased and used. Marketer must be aware of the relevant cultural aspects, and marketing programme should be designed accordingly.

2. Subcultures:

Each culture consists of smaller subcultures. Each subculture provides more specific identification of members belong to it. Product and marketing programme should be prepared in light of subcultures to tailor their needs.

Subculture includes:

i. Nationality:

Every nation has its own unique culture that shapes and controls behaviour its citizens. For example, Indian culture, American culture, Japanese culture, Chinese culture, African culture, etc. Consumers of different nations hold different behaviour toward the company's products and strategies. The company can concentrate on one or more nations to serve.

ii. Religion:

It is a powerful determinant of consumer needs and wants. Every religion has its culture in terms of rules, values, rituals, and procedures that have impact on its followers. Commonly, consumer behaviour is directly affected by religion in terms of products that are symbolically and ritualistically associated with the celebration of various religious events and festivals/holidays.

Religious requirements or practices, sometimes, take on an expanded meaning beyond their original purpose. For example, Christians, Hindus, Muslims, Buddhists, etc., influence food preference, clothing choice, career aspiration, and overall pattern of life.

Even, in each religion, there are several sub-religions. For example, Hindu Religion includes Vaishnav, Swaminarayan, Shivpanthi, Swadhiyai, and likewise; Christian Religion includes Protestants and Catholics; and similar is the case with Muslim and Jain.

iii. Racial Groups:

In each culture, we find various racial groups; each of them tends to be different in terms of needs, roles, professions, habits, preference, and use of products. Each group responds differently to marketing offers due to different cultural backgrounds.

For example, in our country, we find a number of racial groups like Kshatriya, Banya, Patel, Brahmin, Scheduled Caste, Scheduled Tribe, Shepherded, and so forth. These racial groups have their cultural values, norms, standards, habits, etc., that govern their overall response toward the company's products.

iv. Geographical Regions:

Each geographic region represents specific culture and differs in terms of needs, preference, habits, usage rates, and uses of products. Clothing, residence, food, vehicle, etc., are determined by regional climate and culture.

3. Culture of Social Classes:

Philip Kotler defines: "Social classes are relatively homogeneous and enduring divisions in a society, which are hierarchically ordered and whose members share similar values, interest, and behaviour." In many cases, social classes are based on caste system. Members of different castes have their cultures and, accordingly, they perform certain roles.

Social classes reflect differences in income, occupation, education, their roles in society, and so on. Every social class has its culture that affects behaviour of its members. Social classes differ in their dress, speech patterns, recreational preferences, social status, value orientation, etc.

They show distinct product and brand preferences in many areas like clothing, home furniture, education, leisure activities, and automobiles. Kotler identifies following social classes, each of them differs significantly in term of income, skills, needs, habits, preference, career orientation, approach toward life, etc.

i. Upper-upper
ii. Lower upper
iii. Upper middle
iv. Middle class
v. Working class
vi. Upper lower
vii. Lower-lower

Normally, with reference to India, on the basis of income level, or status in society, we can identity three social classes like upper class, middle class, and lower class. In every society, percentage of each of these classes is subject to differ. Marketer should design his marketing programme to cater the needs of specific social classes.

(B) Social Factors:

Here, we examine the effect of social factors on consumer needs and preferences (behaviour). Social factors affect consumer behaviour. Consumer response to product, brand, and company is notably influenced by a number of social factors – family, reference groups, and roles and statuses. Marketer needs to analyze these social factors of his target market to cater its needs effectively.

Let's briefly comment on some dominant social factors influencing consumer behaviour:

1. Family:

Family is one of the most powerful social factors affecting consumer behaviour. This is more significant where there is joint family system, in which children use to live with family for longer time. Values, traditions, and preferences are transmitted from parents to children inherently.

Family members constitute the most influential primary reference group. From family, its member acquires an orientation toward religion, politics, ambition, self-worth, love, respect, and so on. Need, preference, buying habits, consumption rate, and many other aspects determined by family affect one's behaviour.

In every family, elders, husband-wife, other members, and children have varying degree of influence on purchase decision, which is the matter of interest for the marker to appeal them. Some products are children dominant; some products are husband dominant; some products are wife dominant; while some products are equal dominant.

2. Reference Groups:

Philip Kotler states: "A person's reference group consists of all the groups that have a direct (face-to-face) or indirect influence on the person's attitudes or behaviour." Groups having a direct influence on the person are called membership groups.

Normally, following reference groups affect behaviour of their members:

i. Primary Reference Groups:

They are informal groups such as family members, friends, neighbors, relatives, and co-workers with whom the person interact fairly continuously. Habits, life-style, and opinions of these groups have direct impact on the person.

ii. Secondary Reference Groups:

They tend to be more formal groups such as religious groups, professional groups, trade unions or associations, etc., that affect buying decisions of an individual buyer.

iii. Aspiration (Aspired) Groups:

A person is not the member of such groups. But, he likes to belong to those groups. He imitates habits, preference and buying pattern of such groups. For example, college students imitate/like to belong to film stars, sportsmen, or professional groups.

iv. Dissociative (Disliked) Groups:

Theses reference groups include such groups whose values or behaviour a person rejects or dislikes. He tends to behave differently than those groups. A marketer should identify reference groups of his target market and should try to influence those groups. In case of television, automobile, clothing, home furniture, books and magazines, cigarettes, etc., the reference groups have more direct impact on buyers' purchase decision.

3. Roles and Statuses:

A person plays various roles in many groups throughout his life. He has to play different roles in family, club, office, or social organisation. A role consists of the activities that a person is expected to perform. For example, a person is father for his children, husband for his wife, son for his parents, friend for his friends, boss for his department, and a member of social organisation.

Each role carries status. For example, sales manager has more status than sales officer. People choose those products that communicate or represent their roles and statuses in society. Therefore, marketer must be aware of the status symbol potential of products and brands. The marketer should also try to associate products and brands with specific roles and status.

4. Social Customs and Traditions:

Social customs, beliefs or traditions can be associated with religion, caste, or economic aspects. Such customs determine needs and preference of products in different occasions and, hence, affect consumer behaviour.

5. Income Level:

Income affects needs and wants of consumers. Preference of the rich consumers and the poor consumers differ notably. In case of quality, brand image, novelty, and costs, there is wide difference between the rich and the poor buyers. Marketer must be aware of expectations of different income groups of his target market.

(C) Personal Factors:

Along with cultural and social factors, personal factors also affect one's buying decision. Personal factors are related to the buyer himself. These factors mainly include age and stage in life cycle, occupation, economic circumstances, life style, personality, and self-concept. Let us briefly examine the effect of personal factors on consumer behaviour.

i. Age and Stage in Life Cycle:

A man passes through various stages of his life cycle, such as infant, child, teenager, young, adult, and old. Need and preference vary as one passes through different stages of life cycle. For example, child and adult differ to a great extent in terms of needs and preference. Marketer may concentrate on one or more stages of his target consumers' life cycle. Use of different product depends on age and stage of buyers' life cycle.

ii. Occupation:

Buying and using pattern of consumer, to a large extent, is affected by a person's occupation. For example, industrialist, teacher, artist, scientist, manager, doctor, supervisor, worker, trader, etc., differ significantly in term of need, preference, and overall buying pattern. Company can specialize its products according to needs and wants of special professional groups.

iii. Economic Circumstances:

Product preference, frequency of buying, quality, and quantity are largely affected by consumers' economic circumstances. Economic circumstances consist of spendable income, income stability, level of savings, assets, debts, borrowing power, and attitudes toward saving versus spending. People buy products keeping in mind these economic circumstances.

iv. Life Style:

People with the same culture, social class, and occupation may differ in term of their life style. Knowledge of life style of the target market is essential for marketer to design more relevant marketing programme. Kotler defines: "Life style is the person's pattern of living in the world as expressed in the person's activities, interest, and opinions."

Life style portrayed the "whole person" interacting with his/her environment. It is generally reflected in terms of activities, interest, clothing patterns, status consciousness, spending and savings, helping others, achievements, working style, etc. Every product has potential to suit different life styles.

v. Personality:

Personality is a distinguished set of physical and psychotically characteristics that lead to relatively consistent and enduring response to one's environment. Personality characteristics, such as individualism, difference, self-confidence, courage, firmness, sociability, mental balance, patience, etc., have a strong influence on needs and preferences. Every person buys that product which suits his personality. In case of clothing, automobiles, shoes, perfumes, etc., products are influenced by users' personality characteristics.

vi. Self-concept:

It is also referred as self-image. It is what person believes of him. There can be actual self-concept, how he views himself; ideal self-concept, how he would like to view himself; and others-self-concept, how he thinks other see him. Person purchases such product that matches with his/her self-image. Marker must identify self-concept of his target buyers and must try to match the products with them.

vii. Gender:

Gender or sex affects buying behaviour. Some products are male-dominated while some are female-dominated. Male customers react to those products which are closely suit their needs and styles. Cosmetics products are more closely related to female customers than male. Marketer must be aware of gender-effect on buying behaviour of the market.

viii. Education:

Education makes the difference. Highly educated, moderately educated, less educated, and illiterates differ considerably in terms of their needs and preferences. In the same way, stage of education (like primary, secondary, college, etc.) affects buyers' behaviour.

Education factor seems more relevant to academic institutes, book publishers, magazines, and newspapers. Education affects one's mindset. Buyers' colour choice, quality-orientation, services, and other aspects have more or less educational significance.

(D) Psychological Factors:

Buying behaviour is influenced by several psychological factors. The dominants among them include motivation, perception, learning, and beliefs and attitudes. It is difficult to measure the impact of psychological factors as they are internal, but are much powerful to control persons' buying choice. Manager must try to understand probable role the factors play in making buying decisions.

i. Motivation:

It has a significant impact on consumer behaviour. Motivation is closely related to human needs. One has many needs at a given time. Some needs are biogenic or physiological in nature arising from physiological states of tension, such as hunger, thirst, or discomfort.

Other needs are psychogenic or psychological in nature arising from psychological state of tension, such as recognition, esteem, or belonging. Motivation comes from motive; motive is expression of needs; or intensified need become a motive. Thus, a motive is the need that is sufficiently pressing to drive the person to act. Satisfying the need reduces the felt tension.

People hold one or more of following motives to buy:

i. To satisfy basic needs like hunger, thirst, or love
ii. To protect from economic, physical or mental hazards
iii. To get social status
iv. To be recognized or appreciated
v. To be respected
vi. To be self-actualized
vii. To avoid physical or mental stress

Motivation is, thus, a driving force that makes the individual to act to release the tension aroused from unmet needs. A motivated person is ready to act/react. Marketer should identify why people buy the products. What are the motives to purchase the products? If product is connected with their motives, they definitely respond positively.

In fact, the product is a source of satisfying unmet needs. So, product is presented as a solution of tension resulted from unsatisfied needs. Several theories are available to understand motivation aspect.

Most popular theories include Maslow Need Hierarchy, Herzberg's Two-Factor Theory, Stacy Adam's Equity Theory, Vroom's Expectancy Theory, Porter-Lawler Theory, McClelland's Achievement Theory, etc. Knowledge of these theories assists the manager to understand deeper motives the people hold for buying different products.

ii. Perception:

Person's motivation to act depends on his perception of situation. It is one of the strongest factors affecting behaviour. The stimuli – product, advertising appeal, incentives, or anything – are perceived differently by different people due to difference in perception. Marketer should know how people perceive marketing offers.

Bernard and Gary define:

"Perception is a process by which an individual select, organize, and interpret information inputs to create a meaningful picture of the world." Perception depends on physical stimuli and stimuli's relation to surrounding field, too. People perceive the same stimulus differently due to selective attention, selective distortion, and selective retention. So, all consumers may not see the product or message in a way the marketer wants.

Marketer should take these perceptual processes carefully while designing marketing programme. It is necessary that the product or marketing offer must be perceived in a way the market wants to be perceived. Marketer is also required to know the factors that affect people's perception. Tactful interview or questionnaire can help to measure perception of target groups.

iii. Learning:

Most human behaviour is learned. Learning is basically concerned with experience of an individual. Learning can be defined as: Relatively permanent changes arising from experience. If an individual has satisfactory experience of buying and using the products, he is more likely to talk favourably or repeat the same.

Most of purchase decisions depend on self-experience or experience of others, whose opinion carry value in buying decisions. Learning is produced through the interplay of drives, stimuli, cues, responses, and reinforcement. Learning theories help marketer to build up demand for the product by associating it with strong drives, using motivating cues, and providing positive reinforcement.

New company can enter the market by using competitions' drives, cues and reinforcement. Sufficient knowledge of learning is an important input for the marketer to design the meaningful marketing programme.

iv. Beliefs:

People hold beliefs about company, company's goods or services, and they act accordingly. Beliefs of the buyers affect product and brand image. We can define the term as: Belief is a descriptive thought that a person holds about something. Beliefs may be based on knowledge, Note that beliefs have nothing to do with facts or reality. People may have wrong beliefs for the superior product, or they hold positive beliefs for inferior product. Positive and negative beliefs have their impact on purchase decisions. Marketer can create positive belief by associating strong aspects related to product and brand, or can correct wrong beliefs by proper campaign.

It is clear that people buy only if they believe it is worthwhile to buy. So, beliefs play decisive role in the buying decision. Marketer must try to know what type of beliefs people hold about company, products, and brands. Such knowledge must be incorporated in preparing an effective marketing programme.

v. Attitudes:

An attitude is a person's enduring favourable or unfavorable evaluations, emotional feelings, and action tendencies toward some object or idea. These emotional feelings are usually evaluative in nature. People hold attitudes toward almost everything, such as religion, politics, clothes, music, food, product, company, and so on.

Attitudes decide liking or disliking of object. People can judge good or bad, beautiful or ugly, rich or poor, or desirable or undesirable about an object, a product, or a person. Attitudes play a vital role in accepting or rejecting, appreciating or criticizing the product or brand. People do not react to every object in a fresh way. Object is evaluated by attitudes.

So, it is imperative that marketer must know what type of attitudes people hold about the company, products, and brands. Attitudes can be learned or developed. Learning plays an important role in developing attitudes. Even unfavorable attitudes can be changed into favourable ones by systematic campaign. Mostly, beliefs and attitudes are taken simultaneously.