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Effective Distribution of Drugs Through the Use of Information and Communication Technology (ICT): The Case of Selected Pharmaceuticals Companies in Sekondi-Takoradi Metropolis, Ghana

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Abstract
Distribution channels enhanced by ICT ensure the effective distribution of drugs. This paper sought to find out the factors that influence the choice of distribution channel used in ensuring the effective delivery of drugs, make known the role of ICT in the distribution of drugs to save lives in Ghana and also to determine the role played by ICT in achieving effective distribution of drugs within Sekondi-Takoradi Metropolis. One hundred and seventeen (117) respondents were used for the study. The study results reveal that the main distribution channel of drugs is producer-wholesaler-retailer to consumers. This accounted for 60%. The study also revealed that the key function of distribution is to ensure product and information flow. Financial strength/credit rating, goal and strategies, communication among other things were identified as factors that influenced the choice of distribution channels used in ensuring effective delivery of drugs. These factors produced a mean response value above 4.0. Managements of Pharmaceutical shops are encouraged to engage or employ more pharmacists in the handling and administration of drugs and also focus on current software(s) to ensure that the usage of information and communication technology in the pharmaceutical companies is at the prime and bring the essence of urgency to pharmaceutical firms to engage professionals in the field of drug administration to improve service delivery.
Keywords: Distribution channels, Effective delivery of drugs, Information Communication Technology, Pharmaceutical Industry

1.0 Introduction

The pharmaceutical industry has experienced an incredible amount of change since 1960 followed with scientific advances, legislative enactments, new regulatory requirements, and profound organizational changes in the broader health care system, (Nakamura, 2005). For a long time, the pharmaceutical industry has been one of the most profitable industries. The pharmaceutical industry has historically enjoyed comfortable profit margins, consequently stable stock prices and has also enjoyed annual global growth of 9 to 11% in recent years, a remarkable achievement by any standard (Bradley and Weber, 2004). The pharmaceutical industry makes a large contribution to the national GDP and extremely critical to the wellbeing of any nation, (Henry, 2011). This industry plays an extremely important role in preserving the health of people, and unlike other goods and services, access to health care services and products is often considered a personal right or universal entitlement. Innovative drugs offer an effective means for the patients to enjoy better health and avoid expensive treatments requiring hospital visits. The pharmaceutical industry can be defined as a complex of processes, operations and organizations involved in the discovery, development and manufacture of drugs and medications (Shah, 2004). The World Health Organization (WHO) defines a drug as: any substance or mixture of substances manufactured, sold, offered for sale or represented for use in the diagnosis, treatment, mitigation or prevention of disease, abnormal physical state or the symptoms thereof in man or animal and for use in restoring, correcting or modifying organic functions in man or animal, (Nakamura, 2003). The positive contribution to the society notwithstanding, the pharmaceutical industry remains much maligned (Henry, 2011; Shah, 2004). It suffers from a negative image and there is little awareness of its challenges and problems. Efficiency in the pharmaceutical industry is relatively low, with logistics and transportation costs comprising high amount relative to the processing cost in Ethiopia and the sub region of Africa (Bradley and Webber, 2004) but, to put the recent changes in perspective, it is worth noting that the pharmaceutical industry remained stable up until the early 1990s. In other words, leading companies have maintained their dominance and enjoyed uncontested success for almost a century (Bradley and Weber, 2004; Henry, 2011).

This research work is seeking to address the effective distribution of drugs and the role ICT plays in achieving channel objectives. Jobber (2001) mentioned that, all products whether consumer products, industrial products or services require the use of distribution channel and more importantly no industry can succeed without the use of effective distribution channels. Nakamura (2003) claimed that the changing business environment has recently challenged many firms to seek out new methods to achieve sustain performance advantage through market orientation and distribution channel collaboration. Distribution strategy explains the way products are delivered to end customers (Hooley, Piercy & Nicoulaud 2008). Regardless of what the distribution objective is, the company must remember the convenience for customers; being able to deliver the

product in the place, time and quantity customers prefer and at the minimal possible cost. For any organization to be effective there should be effective distribution channel management process to convey finished products from the manufacturer to the final consumers (Coyle et al., 2003). This is because without distribution the best product will not be delivered and the marketing mix will break down and fail. As a result of this, firms are increasingly adopting distribution channels to reduce cost, increase market share and sales, and build solid customer relations through innovative means (Nakamura, 2005).

Information and communication technology (ICT) is a new tool that can be used in cost and quality control enhancement of efficiency (Hougthton, 2002). The ICT revolution is having dramatic effects on practices within the pharmaceutical industry and on the delivery of health services Technology is an important factor by helping to reduce the distribution costs and run the channel successfully, along with its channel management and physical delivery of the goods (Sagbansua & Alabay, 2010). The above authors go further by stating that distribution as a function of marketing, consisting distribution channel management and physical distribution, has significantly improved the physical distribution as a result of developments in the field of information and communication technologies (ICT). Toraman (2002) was also of the view that the use of technology responds positively to all of the important factors listed among the distribution channel mix, such as low-cost distribution channels, convenience for the customer, the quality of the goods and services to be delivered to the customer, and the speed of the delivery. The interface between the pharmaceutical industry and the healthcare industry is also being changed by ICT applications, with many opportunities for cost savings and efficiency gains and also the introduction of ICTs, especially internet-based technologies could contribute a good deal to pharmaceutical industry marketing and distribution. (Houghton, 2002). The potential for e-commerce and internet-based technologies to enhance drug marketing and distribution has only just begun to be tapped, and the scope for further innovation is enormous (Nakmura, 2003; Nakmura, 2005). The distribution process includes the physical handling and distribution of goods, passage of title and the buying and selling negotiations between producers and middlemen and between middlemen and consumers (Cateora & Graham 1996; Nakamura, 2003).

Henry (2011) investigated into value-added service provision through ICT by drug wholesalers in Japan. Coyle, Bardi and Langley (2003) researched on innovation in the distribution channel and how it affects performance of SME's, with special reference to the mediating effect of distribution channel effectiveness. Houghton (2002) examines the impacts of ICTs on the pharmaceutical and healthcare industries. Bradley and Weber (2004) analyze the EU pharmaceutical industry from a Trade perspective. Despite the extant body of research in existing studies, the evidence is glaring that though all these studies were conducted to focus on ICT in various sectors, however, a limited number focused on the role of ICT in enhancing the effective distribution of drugs in Ghana. It is in this sense that the current research posits that there is still a distinct lack of body of literature research regarding the effective distribution of drugs through the use of ICT in Ghana by identifying the factors that influence the choice of distribution channel to be used in meeting customer quality needs and also to determine the benefits of ICT in enhancing the delivery of quality drugs in Ghana, hence the justification of the current research topic (Nakamura, 2005).

The general objective of this research is to contribute to the body of knowledge and research work concentrating on the effective distribution of drugs through the use of ICT in the pharmaceutical industry of Ghana. This study sought to achieve the following as specific objectives: (i) to identify the factors that influence the choice of distribution channel used in ensuring the effective delivery of drugs to the final consumer; (ii) To determine role played by ICT in achieving effective distribution of drugs in Sekondi-Takoradi.

2. Literature Review

2.1 Concepts of Distribution

Carter, Price and Emmett (2005) refer to distribution as the totality of all individual activities with similar organizations, of which these activities are key in ensuring that producers and consumers are properly linked. The term distribution can also refer to the physical trail and legal title involving the movement of goods from the manufacturer to the point of consumption (Coyle et al., 2003). Distribution covers a whole set of activities that is responsible for the transfer of title and rights from producers to consumers. It includes such a coordinated preparation of manufactured goods according to their nature and quantity, space and time; so that lead times can be attained (honoring of orders) or predicted demand can be sufficiently met. Carter et al (2005) were of the view that distribution looks at all processes required in, delivering a company's products or services to the right place, at the right time, for the lowest cost. The term distribution involves ensuring proper handling and movement of goods, including the transfer of the right of ownership and the buying and selling negotiations between producers and middlemen and between middlemen and consumers (Cateora and Graham 1996).

The term distribution channel can be also referred to the following: a distribution chain, a distribution pipeline, a supply chain, a marketing channel, a market channel, and a trade channel. (Ostrow 2009). Coughlan *et al*. (2006) defined a distribution channel as a group of interdependent organizations working together in ensuring that goods and services are made available for use or consumption as and when required. A channel of

distribution refers to laid down steps and processes which makes it possible for manufactured products to end up with the end user (Zikmund & d'Amico, 2001). Etzel, Walker and Stanton (2004) argued that a distribution channel is made up of individuals and organizations mandated to move goods from the point of manufacture to industrial users along with the right of ownership.

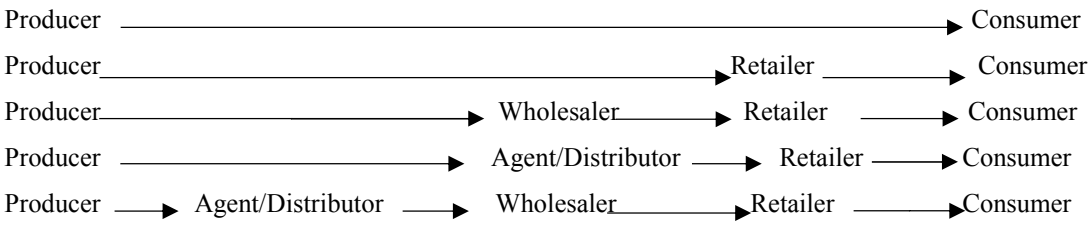

Figure 1: Five alternative consumer channels

Source: Adapted from Jobber, 2001

Producer → Consumer: This channel does not involve any intermediary, the producer or manufacturer deals directly with end users and this makes it a very short channel.

Producer → Retailer → Consumer: This channel of distribution involves the use of a big retailer who takes goo ds from producers in very large quantities.

Producer → Wholesaler → Retailer → Consumer: This channel is by far the most widely used channel often considered as the traditional channel. Goods are taken from the producer to the big wholesalers, who then sell in sizeable quantities to retailers who then sell to the final consumer.

Producer → Agent → Retailer → Consumer: This is a modern trend where producers prefer dealing with agent (middlemen) who takes the goods in large quantities to be given to retailers then to end-users.

Producer → Agent → Wholesale r → Retailer → Consumer: This channel is becoming more important because manufactures will want goods to reach every small retailer to enable their goods to be widespread.

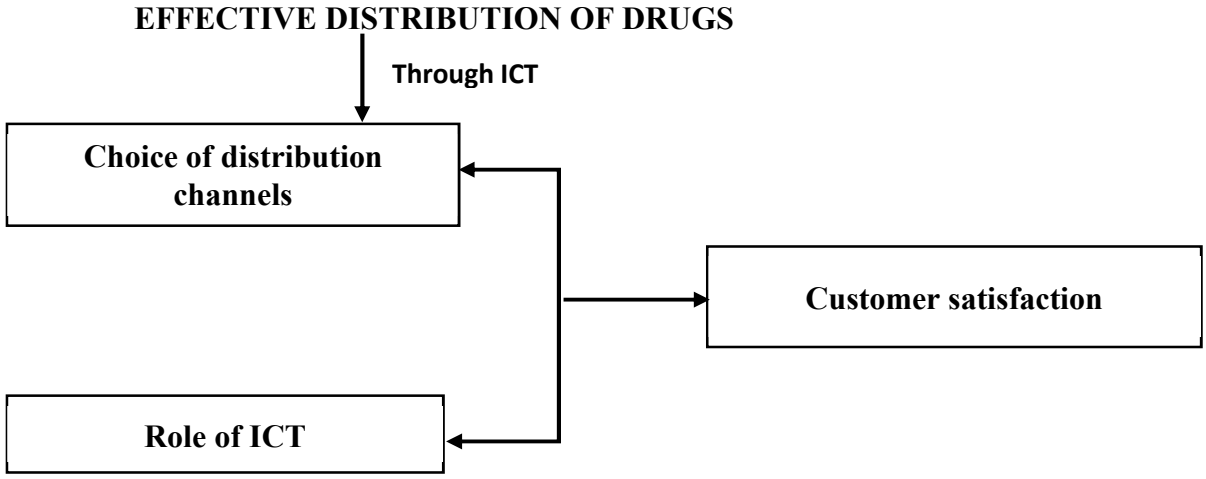

Figure 2: Flow Chart on Effective Distribution of Drugs
Source: Researchers Construct, 2018

Information Communication Technology (ICT) in recent times contributes significantly in distribution. ICT plays the following roles according to Henry (2011): upsurge in the understanding of the market, Simplifying the systems of distribution, Introduction of more types of distribution, Growth in the number of customers, Broader use of e-commerce, Globalization and making it simpler to enter into international markets, and Availability of alternative distribution channels. Shah (2004) identified the following as some of the roles of information technology (IT) in relation to the channels of distribution. These are: Decreased stock, Decrease in the time of

delivery/unbeneficial time of waiting, Decrease in shortage of inventory/ loss of sales, Quicker reaction to changes in the market, Decrease in order placed in a haste, Reduction in overproduction, reduce unnecessary movement (forwarding and back-tracking), Reduce paper-work and wasteful processing, and Adequate planning of production. Experts are of the view that in addressing the role played by ICT in business, emphasis can also be placed on the application of soft wares in distribution activities by organizations (Carter et al, 2005; Bailey et al, 2005; and Arnold, 1991). These concepts of business communicating electronically includes: electronic data interchange (EDI); enterprise resource planning (ERP); automatic planning and scheduling (APS); warehouse management system (WMS); computerized road vehicle routing and scheduling; and sales and operations planning (SOP)

3.0 Methodology

The study adopted a descripto-explanatory research; a combination of both descriptive and explanatory research design (Twenefour et al., 2015). The design allowed detailed description and analysis of the variables under study; describing and presenting their attributes and explaining their relationships without manipulations (Twenefour et al., 2015). The study covered a 117 respondents composing of manufacturing, pharmaceutical and chemical shops within Sekondi-Takoradi Municipality, Ghana. A semi-structured, self-administered questionnaire was used to collect data. Before administration, the questionnaire was pilot-tested and subjected to reliability test using Cronbach Alpha; resulting in a reliability coefficient of 0.949 which was above the recommended minimum of 0.7 (Santos & Reynolds, 1999). Data collected was analyzed using the statistical package for service solution (SPSS version 21). Descriptive statistics was used to explain the variable characteristics (Twenefour et al., 2015).

Results and Discussions

A reliability test using Cronbach Alpha resulted in a reliability coefficient of 0.945% (95%) which is above the recommended minimum of 0.7 (Santos and Reynolds, 1999; Twenefour, 2017) was conducted on all the variables from the respondents used in the study. This indicates that the questionnaires were 95% reliable to be used for descriptive-exploratory study (Twenefour, 2017).

Table 1: Positions held by respondents in their respective companies

Position	Response	Percentage (%)
Pharmacist	39	33.0
Sales Executive	51	44.0
Others	27	23.0
Total	**117**	**100**

Table 1 above depicts that, of the total of 117 respondents, 39 (33.0%) were pharmacists, 51 respondents representing (44.0%) were Sales executives whereas 27 (23.0%) were Managers, Attendants etc. This indicates that the majority of the respondents were Sales executives.

Table 2 shows a dichotomy group tabulated at value 1 (where 1 = yes). Considering the result, Table 2 shows that the main channels of direction employed by respondents' organization in the distribution of drugs was done through produce-wholesaler-retailer-consumer. These produced a count of 69 out of 117 respondents' and accounted for 41%.

Table 2: Channels of Distribution

Channels of Distribution	Responses		Percent of Cases
	N	Percent	
Producer-Consumer	8	5.0%	6.9%
Producer-Retailer-Consumer	32	19.0%	27.6%
Producer-Wholesaler-Retailer-Consumer	69	41.0%	59.5%
Producer-Agent-Retailer-Consumer	28	17.0%	24.1%
Producer-Wholesaler-Agent-Retailer-Consumer	31	18.0%	26.7%
Total	117	100.0%	144.8%

a. Dichotomy group tabulated at value 1.

This was followed by producer-retailer-consumer and producer-wholesaler-agent-retailer-consumer, which accounted for by 19% and 18% in that order. The least channel of direction was observed to be producer-consumer (5%).

Table 3: Functions of a distribution channel to pharmaceutical companies

Statement	Response (n = 117) Percentage (%)				
	1	**2**	**3**	**4**	**5**
Product flow	3	3	4	28	79
	(2.6%)	**(3.6%)**	**(3.4%)**	**(23.9%)**	**(67.5%)**
Information flow	2	2	6	39	68
	(1.7%)	**(1.7%)**	**(5.1%)**	**(33.3%)**	**(58.1%)**
Aggregation	0	8	19	55	35
	(0%)	**(6.8%)**	(16.2%)	**(47.0%)**	**(29.9%)**
Promotion	8	6	22	27	54
	(6.8%)	**(5.1%)**	**(18.8%)**	**(23.1%)**	**(46.7%)**
Risk taking	4	8	17	49	39
	(3.4%)	**(6.8%)**	**(14.5%)**	**(41.9%)**	**(33.3%)**

Key: 1 = Strongly Disagree, 2 = Disagree, 3 = Not sure, 4 = Agree, 5 = Strongly Agree

A critical analysis of Table 3 posited 79 respondents representing (67.5%) strongly agree that, a key function of distribution channel is to ensure product flow. Also, 68 (58.1%) strongly agree that, distribution channel encourages product flow with a minimal percentage of respondents responding otherwise. Again, considering aggregation and promotion, 55 respondents representing (47.0) and 54 respondents representing (46.7%) respectively affirm that distribution channel ensures the above stated processes. Majority of the respondents; 49 (41.9%) also did agree that, distribution channel ensures risk taking with a minimal portion responding otherwise. The above result indicates that, the functions distribution channel performed in the distribution of drugs are mainly to ensuring effective product flow, information flow, aggregation, promotion and also risk taking.

Table 4 presents in descending order the factors considered when making a decision on the type of a distribution channel to be used by pharmaceutical companies. Mean response values and its associated ranked values were used to determine which of the factors were deemed very important. Result on Table 4 shows that most perceived factor to be considered when making a decision on the type of channel to be used by the companies is financial strength/credit rating.

This produced a mean response value of 4.53 and ranked 1. This was followed by goals and strategies, communications and overall experience/attitude/commitment. These produced mean values of 4.43, 4.41 and 4.30 (see Table 4).

Table 4: Factors that Influence the Choice of distribution channels used in ensuring effective delivery of drugs

Factors	N	Min	Max	Mean	Mean Rank
Financial strength/credit rating	117	1	5	4.53	1
Goals and strategies	117	1	5	4.43	2
Communications	117	1	5	4.41	3
Overall experience/attitude/commitment	117	1	5	4.30	4
Size of the firm	117	1	5	4.22	5
Experience in products/with competitors	117	1	5	4.22	5
Reputation with suppliers, customers, and banks	117	1	5	4.21	7
Willingness to carry inventories	117	1	5	4.21	7
Market Consideration	117	1	6	4.21	7
Record of sales performance	117	1	5	4.19	10
Knowledge/use of promotion	117	1	5	4.19	10
Sales organization and quality of sales force	117	1	5	4.17	12
Trading areas covered, Compatibility	117	1	5	4.16	13
Physical facilities	117	1	5	4.15	14
Product Consideration	117	1	6	4.13	15
Cost of operations	117	1	5	4.09	16
After-sales service capability	116	1	5	4.03	17
Lines handled	117	1	5	3.94	18
Knowledge of English or other relevant languages	117	1	5	3.88	19
Relations with local government	117	1	5	3.87	20
Willingness to cooperate with the exporting company	117	1	5	3.73	21
Middlemen Consideration	117	1	6	3.72	22
Knowledge of business methods in the exporting company's country	117	1	5	3.56	23

The least recorded factors were: willingness to cooperate with exporting company, middlemen

consideration and knowledge of business methods in the exporting company's country with mean values of 3.73, 3.72 and 3.56 correspondingly. It is worth noting that the higher the mean, the more consistent the factor and vice versa.

The role of ICT in effective distribution was examined using mean and its associated ranking. In all sixteen variables were examined (see Table 5). It is worth noting that the higher the mean the more effective the statement/item (variable). Growth in the number of customers, reduced paper-work and wasteful processing, adequate planning of production and simplifying the system of distribution were the first four statement respondents posited to be the most important role to be considered with respect to the role of ICT in the effective distribution of drugs.

Table 5: The Role of ICT in Effective Distribution of Drugs

Statement/Item	N	Min	Max	Mean	Mean Rank
Growth in the number of customers	117	1	5	4.32	1
Reduce paper-work and wasteful processing	117	1	5	4.28	2
Adequate planning of production	116	1	5	4.25	3
Simplifying the systems of distribution	117	1	5	4.23	4
Reduce unnecessary movement	117	1	5	4.21	5
Introduction of more types of distribution	117	1	5	4.21	5
Availability of alternative distribution channels	117	2	5	4.21	5
Quicker reaction to changes in the market	117	1	5	4.11	8
Reduction in overproduction	117	1	5	4.10	9
Upsurge in the understanding of the market	117	1	5	4.05	10
Globalization and making it simpler to enter into international markets	117	1	5	3.97	11
Broader use of e-commerce	117	1	5	3.90	12
Decrease in order placed in a haste	117	1	5	3.82	13
Decrease in shortage of inventory/ loss of sales	117	1	5	3.65	14
Decrease in the time of delivery/unbeneficial time of waiting	117	1	5	3.63	15
Decreased stock	117	1	5	3.39	16

This produced a mean value of more than 4.23. However, decreased stock was the least variable in the role of ICT in the effective distribution of drugs. When asked which of the software(s) does your organization used and to what extent do they contribute to the effective distribution of drugs. Respondents posited sales and operations planning (SOP), electronic point of sale (EPOS), warehouse management system (WMS), and enterprise resource planning (ERP) as the most used software by respondents' organization with a mean value of 4.07, 3.74, 3.59 and 3.47.

Table 6 examines the constituents of effective distribution from a dichotomy group tabulated at value 1 (yes). Out of 359 counts, 90 counts representing 25% of the respondents and constitute the majority indicated that when there is shared risk among channel members. This was followed by the variable (statement): when drugs are sent to the replaces required by consumers (24.8%), when distribution serves as a means of promoting drugs (18.9%) and when there is free flow of information on drug requirements (16.4%). The least constituents observed by respondents were when distribution makes it possible for aggregation of drugs. This accounted for 14.8% (see Table 6).

Table 6: Constituents of Effective Distribution

Variables	Responses		Percent of Cases
	N	Percent	
When drugs can be easily sent to places required by consumers	89	24.8%	77.4%
When there is free flow of information on drug requirements	59	16.4%	51.3%
When it is possible for drug aggregation for distribution to the various channels of distribution	53	14.8%	46.1%
When distribution is used as means of promoting drugs	68	18.9%	59.1%
When there is sharing of risk among the channels of distribution	90	25.1%	78.3%
Total	359	100.0%	312.2%

a. Dichotomy group tabulated at value 1.

This shows that most of the respondents believed that there is sharing of risk among the channel of distribution and drugs also agree to the fact that drugs can be easily sent to places required by consumers.

CONCLUSION

The study revealed a number of issues in relation to the research on the topic effective distribution of drugs through the use of ICT, a case that was drawn from selected pharmaceutical firms in Sekondi-Takoradi metropolis. For the purpose of this research, it was established that; the personnel involved in the handling and

managing drugs in pharmaceutical firms were sales executives instead of qualified Pharmacist. This showed that there were not enough pharmacists available to handle this responsibility (this is shown in the majority of respondents being sales executives constituting 44%). Also, Pharmaceutical firms used the distribution channel of producer-wholesaler-retailer-consumer in the distribution of drugs due to the fact that most manufacturers wanted their products to be widespread reaching all users of their products. The research further confirmed the functions of a distribution channel by Jen-Yun (2009), which are: product flow, information flow, aggregation, promotion and risk taking were revealed in this study as majority of the respondents selected the highest rating. All factors listed in relation to what constitute effective distribution were embraced as the high mean values recorded showed that all factors were effective in making channel decisions. This indicates that wide range of considerations needs to be made in taking good channel decisions for the effective distribution of drugs. Drugs are said to be effectively distributed when there is sharing of risk among the channel members and can also be easily sent to places required by consumers.

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