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Influence of Risk Perception on Marketing of Chemicals in Nigeria

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***Abstract*:** Risk perception refers to the way risk is regarded, understood and interpreted while risk is the probability of incurrence of hazards in certain activities. This study investigates the influence of channel members' risk perception of chemical exposures on marketing of chemicals in Nigeria. The study is a survey design and adopts stratified and simple random sampling techniques. One hypothesis and a research question guided the study. The target population is 876 involving 47 producers, 18 importers, 103 wholesalers, 230 retailers and 478 industrial consumers in Aba and Onitsha. The sample size is 275. The sample size for each category of the respondents is determined. Primary and secondary sources of data are accessed. In-depth interviews are held. The structuring of the questionnaire is based on the five-point Likert scale format. Opinions of marketing experts are used in the questionnaire validation. The scores derived from the pilot study are processed using Cronbach Alpha technique. A reliability coefficient of the research instrument, 0.952 is estimated. Using one way ANOVA technique and Minitab software package, the hypothesis is tested at 0.05 level of significance and 19 degrees of freedom. The study reveals non-significant influence of risk perception of chemical exposures on marketing of chemicals. It is recommended that enlightenment campaigns should be mounted by the Chemical Society of Nigeria and Media Organizations to raise risk perception of chemical exposures as to suppress risk tolerance and high-risk behaviors of channel members, among others

Keywords: Chemical exposures, Channel members, Health disorder, Risk perception, Risk tolerance.

1.0 Background of the Study

It is a common observation that people wittingly indulge in variety of activities that cause harm to human health and the environment on regular basis. A situation where risk taking is a matter of choice as in the marketing of chemicals provides opportunity to analyze behavior of the marketing intermediaries on the basis of their willingness to avoid perceived risk or accept risk tradeoff for financial gains.

The perception of risks associated with a vocation may resonate within the hybrid of absolute truth based on facts and virtual truth shaped by popular opinion or media coverage. According to National Safety Council (2003), risk can be measured in terms of its probability of occurrence and severity of the adverse effects. In the context of this study, risk perception reflects the ability of a channel member, (i.e., chemical manufacturer, wholesaler, retailer or customer/end-users) to recognize, interpret and create meaningful picture of risks associated with chemical exposures (Kotler & Keller, 2009). It comprises of personal interpretation of information about risks arising from the marketing of chemicals in a way that fits the channel members' preconceptions, beliefs and expectations in tandem with actual behavior (Chisnall, 1975).

Chemicals are substances that result from reactions involving atomic or molecular changes or natural phenomenon. It is important to note that the marketing of chemicals is an integral part of industrial marketing reserved for goods and services destined for use in producing other goods (Achison, 2000). It is a specialized function of management that directs the flow of chemicals from the producers or importers to the distributors or end-users as to effectively match supply and demand to accomplish the organization's objectives. The chemicals are utilized directly as either raw materials with little or no alterations or manufactured goods in the production of other goods. They play significant roles in human development and affect every sphere of modern life. Chemicals serve as inputs to agricultural, manufacturing, mining, construction and service sectors of the economy. They are not usually supplied directly to consumers except in the form of products that are encountered in everyday lives such as degreaser, paints, printing inks, adhesives and sealants, among others. Chemicals may be categorized into a few sub-groups for commercial purposes, such as basic, specialty and life science chemicals. Examples of basic chemicals include polymers, petrochemicals, industrial/inorganic chemicals and fertilizers. Inorganic chemicals are salt, chlorine, caustic soda, soda ash, titanium dioxide, acids and others. Fertilizers include phosphates, ammonia and potash chemicals. The life science chemicals are pharmaceuticals, diagnostics, animal health products, vitamins, and pesticides. Chemicals are used to produce variety of consumer products found in homes and offices such as waxes/ polishes, blind, air refresher and plastic dustpan. Personal care products such as soaps, detergents, hair shampoos/conditioners, toothpastes, cosmetics and deodorants are made from chemicals. These consumer products are formulated from basic and specialty chemicals.The demand for chemicals is derived from the ultimate demand of customers for both the industrial and consumer products. The chemicals are usually stocked in the warehouses and sold through network of intermediaries to the end users.

People are continuously exposed to chemicals as a result of the exchange transactions. But chemical exposures arising from marketing of chemicals have been linked to varieties of health disorders. The perceived knowledge of the risks associated with chemical exposures may possibly affect the production or importation, distribution and sales of chemicals since human health is involved. The influence of risk perception of chemical exposures by chemical manufacturers, wholesalers, retailers and customers/end-users on marketing of chemicals constitutes the core of investigation of this study.

1.1 Statement of the problem

Human contacts with chemicals directly or through substances containing chemicals lead to exposures. Chemical exposures may not always be harmful but in certain cases they can cause health disorders. Responses to chemical exposures differ with individuals. Some people tend to be less sensitive to chemicals while others may experience severe reactions. Studies have shown that certain variables which influence an individual's susceptibility to chemical exposures include age, gender, genetics and pregnancy (Greitens, 2016). The potential risks associated with chemicals depend on the types of chemical, dosage, duration, frequency and routes of exposure (ATSDR, n.d.). Children, pregnant women and old people appear to be more vulnerable. Long term exposure of people to chemicals has been associated with health disorders such as organ damage, weakening of the immune system, reproductive problems/ birth defects, effects on the mental cognitive or physical development of children, cancer, among others (Pressinger, Tampa & Sinclair, 2015). The health effects depend on the toxicity of chemicals that enter the body through breathing, eye contact or skin and ingestion. They move into the bloodstream and circulate to internal organs to infect the respiratory, renal, cardiovascular, nervous and hepatic systems including the skin. Several illnesses ranging from lung cancer, chronic bronchitis, kidney tissue damage, heart failure, to inability of the blood to supply oxygen to the body have been linked to chemical exposures (ATSDR, n.d.). The effects of chemicals on reproductive and nervous systems include infertility, baby deaths and decreased speech, sight/memory, respectively (ATSDR, n.d.). The chemicals affect the immune system by causing autoimmunity which makes the body to attack itself (Pressinger, et al., 2015). The hepatic system is impaired, which may result in liver damage, tumors, accumulation of fat (steatosis) and death of liver cells due to chemical exposures. The possible effects of chemicals on the skin include irritation, rash, redness or discoloration and dermatitis (ATSDR, n.d.). About 47,000 persons, mostly children and adolescents die every year as a result of chemical poisoning (WHO, 2017). The perceived knowledge of the risks involved in marketing of chemicals through exposures ought to affect the participation of channel members in the occupation and reduce volume of

transactions. In spite of the chemical exposures and dire health consequences inherent in the marketing of chemicals, the trade continues unabated. Many people are deeply involved in the vocation on daily basis, with influx of new entrants (apprentices). Does it mean that these people are unaware of the health hazards or dangers of chemical exposures? Can financial considerations outweigh the health implications of chemicals marketing? To what extent has risk perception of chemical exposures influenced the marketing of chemicals in Nigeria? This study is aimed at addressing the aforementioned queries, among others.

1.2 Objectives of the study

The broad objective of the study is to assess the influence of risk perception of chemical exposures on marketing of chemicals in Nigeria. The specific objective is to determine the extent to which risk perception of chemical exposures has influenced the marketing of chemicals in Aba and Onitsha.

1.3 Research question

To what extent has risk perception of chemical exposures influenced the marketing of chemicals?

1.4 Delimitations of the study

The study is limited to the States of Abia and Anambra in the South East Zone of Nigeria. The commercial nerve centers of Aba and Onitsha are selected for the research because of increasing business activities and high concentration of chemical manufacturers/ importers, wholesalers, retailers, customers/end users in the areas.

1.5 Hypothesis formulation

At 95% confidence level, the hypothesis, stated in null and alternate forms, is formulated for testing as shown below:

Ho. Risk perception of chemical exposures has no significant influence on marketing of chemicals.

H_1 . Risk perception of chemical exposures has significant influence on marketing of chemicals.

2.0 Review of related literature.

The study literature is reviewed from the perspectives of the conceptual and theoretical frameworks.

Conceptual framework.

An understanding of the concept of risk perception and risk tolerance is capable of increasing safety awareness in the environment. The ability of an individual to previse the occurrence of hazards refers to risk perception. Risk tolerance is a person's capacity to accept risk to a certain limit. Risk perception and risk tolerance are mutually related. Studies have shown that the inability of an individual to perceive risk with accuracy can arouse higher risk tolerance, leading to high-risk behavior. Conversely, habitual involvement of individuals in high-risk activities may lead to higher risk tolerance and lower risk perception (Dow Chemical, 2010). Situations may arise where higher risk tolerance levels are not linked to lower risk perception ability. A person may possess the ability to assess risk with its potential consequences accurately and still show willingness to tolerate higher risks. The marketing of chemicals is potentially hazardous, yet many people are

unperturbed undertaking the business venture. An individual's depth of knowledge about an activity can affect his or her risk tolerance level. Vernero and Montanari (2007) noted the unwillingness of workers in a chemical plant to wear personal protective equipment because of their perceived knowledge of the attendant risks. Weyman and Kelly (1999) explain that the ability of a worker to exercise personal control over a situation can lessen anxiety and propel him toward engaging in unsafe behaviors. Channel members who believe they are well informed about the risks of exposures arising from various activities of chemical production/importation, distribution and usage are more likely to take risks because of the perceived knowledge and possession of higher levels of risk tolerance .The channel members who are less informed of the risky nature of chemical exposures are less likely to take risks and have lower levels of risk tolerance or may even exhibit high risk behavior and tolerance level, depending on the individual's own perception of knowledge. The motivation for the high risk behaviors of the channel members may stem from the profitability of chemicals marketing coupled with the indispensability of chemicals in national development. The study therefore focuses on the extent to which the motivation of channel members in embarking on chemicals marketing has been affected by their perceived knowledge of the inherent risks of chemical exposures.

Theoretical framework.

The study is anchored on Situated Rationality Theory. The theory postulates that to presume safe behaviors are inherently rational and high-risk behaviors are inherently irrational is erroneous. The implication is that some people wittingly take risks based on rational justifications and not that they are crazy. According to Slappendal, et al. (1993), in occupational safety, workers may not adhere to safe work procedures in order to complete work more efficiently. Finucane, et al. (2000) opine that the greater the perceived benefit of an activity, the lower the perceived risk. Many channel members may have justifiable reasons for engaging in the business of chemicals marketing, health implications notwithstanding. Invariably, if the financial gain associated with the marketing of chemicals is huge, channel members may consider it rational to take the risks of chemical exposures. The study also focused on the Habituated Action Theory which states that engaging in high-risk behavior severally without the occurrence of dire consequences often decreases the perceived risk associated with this behavior. As Kasperson, et al. (1988), and Weyman and Kelly (1999) noted, people who repeatedly perform high-risk tasks without adverse consequences eventually become desensitized to the risks. Because some health disorders/hazards associated with chemical exposures may take a long time to manifest, channel members ideally become less sensitive to the

inherent risks of chemicals marketing. Rhodes (1997) remarks that "behaviors which are habitual do not demand risk assessment or calculation for their doing; they are simply done". The relatively large numbers of people in Aba and Onitsha who are engaged in the marketing of chemicals, in spite of the danger of chemical exposures, tend to corroborate this assertion.

3.0 Methodology

The study adopts a survey method. The target population is 876 comprising of importers (18), manufacturers (47), wholesalers (103), retailers (230) and end users (478) of chemicals. The sample size of 275 is determined using Yamane (1967) formula (Eboh, 2009). Applying Bowley's proportional allocation statistical technique, the sample size for each category of respondents is estimated, viz: importers (6), manufacturers (15), wholesalers (32), retailers (72) and end users (150). Primary and secondary sources are accessed for data collection. The structuring of the questionnaire is based on a five-point Likert Scale format to obtain enhanced responses of channel members' risk perception of chemical exposures on the marketing of chemicals. Marketing experts validated the questionnaire. The data from the pilot study are applied in determining the reliability coefficient, 0.952 of the research instrument using Cronbach's Alpha technique. The hypothesis of the study is formulated and tested at 0.05 level of significance and 19 degrees of freedom. Using one-way ANOVA technique and Minitab Statistical software package, the extent of influence of channel members' risk perception of chemical exposures on marketing of chemicals is determined.

4.0 Data Presentation and Analysis

Table 4. 1: Profile of Respondents.

Parameters	Total	Percentage (%)
Category		
Importers	6	2.2
Manufacturers	15	5.5
Wholesalers	32	11.6
Retailers	72	26.2
End-users	150	54.5
Age		
20-30	29	10.4
31-40	70	25.6
41-50	84	30.7
Above 50	92	33.3

Gender		
Male	242	88.0
Female	33	12.0
Marital status		
Married	215	78.0
Single	60	22.0
Qualification		
Ph.D.	3	1.1
MSc/MBA	14	4.9
BSc/HND	18	6.7
ND/NCE	31	11.3
WASC/GCE	116	42.2
FSLC	93	33.8

Source: Field data, 2018

Table 4.1 shows that negligible percentages of the respondents are chemical importers (2.2) and manufacturers (5.5). Retailers (26.2%) outnumber the wholesalers (11.6%) while the percentage of the end users involved in the study is 54.5. The age brackets of the respondents show that 64 percent are above 40 while the rest (26%) are within 20 and 40 years old. About 88% of the respondents are males and female 12%. The married respondents are 78% and singles 22%. The literacy levels of the respondents indicate that 76% possess FSLC/WASC/GCE, 11.3% OND/NCE while a few of them (12.7%) has higher qualifications.

Table 4.2. Influence of risk perception on marketing of chemicals

Questions	No of Respondents Agree. A	Scores of Respondents. Agree.(A-Scores)	No. of Respondents Disagree. D	Scores of Respondents. Disagree.(D-Scores)	Total No. of RespondentsA+ D
1	220	741	55	94	275
2	77	189	198	529	275
3	177	590	98	166	275
4	137	234	138	449	275
5	198	628	77	125	275
6	100	188	175	581	275
7	102	312	173	320	275
8	127	289	148	375	275
9	120	264	155	331	275

10	158	292	117	513	275
Total	1416	3727	1334	3483	2750
Mean	141.6	372.7	133.4	348.3	275

Source: Field Survey, 2018.

Table 4.2 shows that 52 percent (1416) of the respondents affirm that risk perception of chemical exposures has not significantly influenced the marketing of chemicals while the rest 48 percent (1334) differ in opinion.

4.1 Test of hypothesis.

One-way ANOVA: A-Scores, D-Scores

Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Factor	1	2977	2977	0.08	0.775
Error	18	637804	35434		
Total	19	640781			

Model Summary

S	R-sq	R-sq(adj)	R-sq(pred)
188.238	0.46%	0.00%	0.00%

Means

Factor	N	Mean	St Dev	95% CI
A-Scores	10	372.7	201.2	(247.6, 497.8)
D-Scores	10	348.3	174.4	(223.2, 473.4)

Pooled St Dev = 188.238

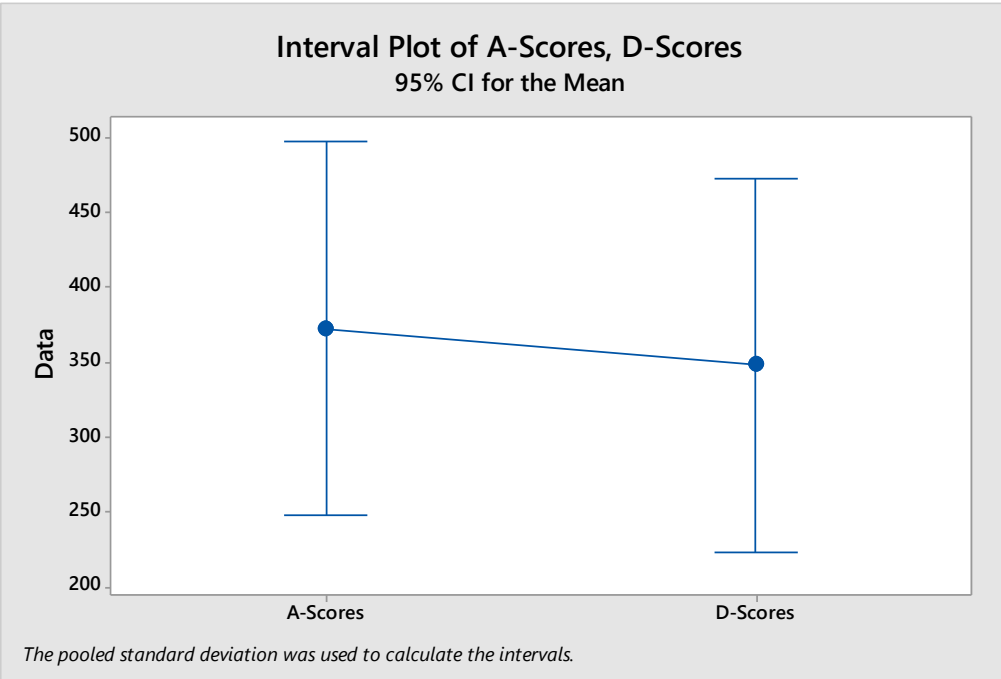

Figure 1. Interval Plot of A-Scores, D-Scores

In Figure 1, the plots reflect the intervals between the enhanced opinions of channel members' risk perception of chemical exposures on marketing of chemicals.

Section 4.1 shows that F-critical (4.38) is greater than F-computed (0.08) at 0.05 level of significance and 19 degrees of freedom. The null hypothesis, H_O is not rejected. The p-value provides a confirmation of the decision. The p-value, 0.775 is greater than the significance level of 0.05 (i.e, p>0.05). The co-efficient of determination, R^2 (adj) is zero percent. The null hypothesis is therefore upheld. In conclusion, channel members' risks perception of chemical exposures has no significant influence on marketing of chemicals.

5.0 Discussion of Results

The findings of the study reveal non-significant influence of channel members' risk perception of chemical exposures on marketing of chemicals in Nigeria. The result of the study implies that the health disorders/hazards associated with frequent contacts of channel members with chemicals have not affected the volume of exchange transactions. Perhaps, it may be that the channel members are not fully aware of the health implications of chemical exposures or financial considerations have shrouded their sense of personal safety and instinct of self-preservation The Habituated Action Theory corroborates the revelations of this study. The theory states that engaging in high-risk behavior severally without

the occurrence of dire consequences often decreases the perceived risk associated with this behavior. In line with the opinions expressed by Kasperson, et al. (1988) and Weyman, et al. (1999), people who repeatedly perform high-risk tasks without an adverse consequence eventually become desensitized to the risks. Because the health disorders arising from chemical exposures, often manifest much later and not in the immediate for people to feel the pain, decrease in risk perception and high risk tolerance of channel members occur. The low literacy level of the greater number of channel members could be contributory to the low risk perception of the longer-term health effects of chemical exposures. The report of Finucane, et al. (2000) which states that the greater the perceived benefit of an activity, the lower the perceived risk further confirms the result of the study. The financial benefits associated with marketing of chemicals may have subdued the risk perception of channel members. For instance, at Ajasa market in Onitsha, observations have shown that some channel members share store spaces with chemicals and rarely use personal protective equipment such as coveralls, hand gloves, nose masks and eye goggles when re-packaging chemicals for wholesaling or retailing. Chemicals such as calcium hypochlorite, calcium carbide and formaldehyde with pungent smell are freely measured on weighing balances with no safety measures in place. Unmindful of the dangers of chemical contacts including the fumes being inhaled daily, some channel members still place food stuff alongside the chemical substances in their offices /mini-warehouses which may lead to chemical poisoning. The huge financial gains associated with the trade seem to receive greater consideration than the health implications. The unsafe use of pesticides and disposal of their containers at refuse dumps in Aba metropolis also contribute to the frequency of human contacts with chemical contaminants. Furthermore, the theory of Situated Rationality buttresses the report of this study. The theory postulates that it is erroneous to presume safe behaviors are inherently rational and high-risk behaviors are inherently irrational. The high risk behaviors of the channel members engaged in marketing of chemicals even in the face of hazards of chemical exposures could not be judged irrational. The members wittingly take risks based on rational justification for financial gains and not that they are ignorant. As the channel members 'risk perception exerts insignificant influence on marketing of chemicals, emergence of safety culture can create more risk awareness and less risk tolerance in the psyche of members to minimize the attendant health disorders.

5.1 Implications of the study.

The study has several implications. It exposits the need for promotion of chemical safety in the environment and protection of public health. It signals the imperative of synergy between the regulatory authorities and chemical

channel members in the coordination of policies and activities for sound management of chemicals in Nigeria. The study reveals knowledge gap for possible research into risks characterization and assessment to identify chemical exposure limits that either present non-significant health threats or serious health disorders, as to provide framework for making risk management decisions. In addition, the study posits a paradigm shift in social behavior from risk tolerance and high risk dispositions of channel members to heightened risk perception of chemical exposures through an enthronement of safety culture in the distribution net work.

5.2 Conclusion.

The report of the study shows that the way risk relating to human contacts with chemicals is regarded, understood and interpreted by channel members has no significant influence on the business of chemicals marketing in Nigeria. When a channel member makes personal decision to engage in marketing of chemicals, in consideration of justifiable reasons and in spite of the inherent risks, situated rationality theory is in operation. The channel members would likely make poor judgment about risks if they have performed their tasks repeatedly without incurring health disorders. The longer-term health effects from chemicals due to delayed manifestation of ailments tend to convince channel members of the safety of their modes of operation. They become desensitized about the risks of chemical exposures, leading to lower risk perception and high risk behavior. When huge financial gains are envisaged in chemicals marketing, risk tolerance and risk taking behaviors of the channel members would likely increase irrespective of enhanced risk perception. That channel members' considerations of financial benefits seem to outweigh the risks of chemical exposures ought to be worrisome. Any attempt to increase risk perception and suppress risk-taking behavior and risk tolerance levels of channel members engaged in the marketing of chemicals would safeguard the lives of citizens of this country and sustain the environmental health and safety.

5.3 Recommendations.

The following recommendations are articulated to create safety culture, increase risk perception, suppress risk tolerance and high-risk behaviors of members of the chemical distribution channels.

i) All chemical channel members should be registered by the professional body of Chemists, i.e., Chemical Society of Nigeria.
ii) Wearing of personal safety protective equipment should be mandatory to channel members and enforced by Chemical Society of Nigeria.
iii) Regular workshops, conferences and training programs should be organized by the professional body to educate channel members on dire consequences of chemical exposures.
iv) Every stage of chemical production/importation, wholesaling, retailing and

usage/disposal should be analyzed and properly scrutinized to reduce frequency of human contacts with chemicals.

v) Enlightenment campaigns should by mounted by Chemical Society of Nigeria/Media to increase awareness and raise public risk perception of chemical exposures and lower risk tolerance.

vi) Governments to create policies geared toward discouraging the public from engaging in marketing of chemicals without appropriate training, equipping and certification.

vii) The Federal and State Environmental Protection Agencies should strengthen cooperation of the intermediary organizations and increase coordination in the field of chemical safety.

viii) Legislative mandates on risks characterization and assessment to determine limits of chemical exposures and attendant health threats should be established and compliance to safety measures enforced.

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