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CEMENT CLASSIFICATION IN NIGERIA: THE PROSPECTS FOR THE NEW STANDARDISATION POLICY

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Abstract: Follawing the alarm raised by a coalition of civil society groups and professional bodies in the construction industry on the manufacturing and importation of poor quality cement into the country, the Standards Organisation of Nigeria (SON) recently convened and mandated a Technical Committee to formulate new standards for cement in the country. Though belated, this response to the alarm should help ensure that henceforth, only high quality cement that can guarantee the strength and safety of buildings is either produced or imported into the country. For some time now, the quality of cement sold in the country has been compromised at will, leaving unpleasant consequences such as frequent collapse of buildings across the country, with attendant loss of lives and property. There have been worrisome reports of different grades of sub-standard cement in the market, with consumers largely unaware that certain grades of cement were not suitable for housing construction. The use of law-grade cement probably contributed to the problem of collapsing buildings in the country. The loss of lives in the collapsed buildings could clearly have been avoided if proper quality standards had been set and enforced, and the people educated on the grade of cement to use for block making and house plastering. Nevertheless, it is good that SON has now taken necessary steps to formulate cement standards for Nigeria. This will help users of the product to establish the relationship between the quality of the cement that they use and the strength and safety of their buildings. We commend SON under the leadership of Dr. Joseph Odumodu for responding quickly to the alert raised by stakeholders in the construction industry. This paper addresses the challenges raised above and suggests that poor building practices are key to the problem of building collapse and that efforts to curb this problem would be beyond the scope of the Technical Committee alone but to all stakeholders. From these reviews and current development in the Nigerian cement industry in the last four months the paper concludes that with the availability of 32.5, 42.5 and 52.5 grade of cement in the country, it is high time for massive education of bricklayers and masons all over the country for them to know the right kind of cement for a given project and thus ensure safety of buildings.

Keywords: Cement and Cement Classifications, Standards Organisation of Nigeria and standardisation, Cement War, Building Collapse in Nigeria and Technical Committee.

Introduction

The recent campaign by a coalition of civil society groups and professional bodies in the building industry against ineffective standardization of locally produced and imported cement in the country has thrown up foggy but crucial issues which demand urgent attention to ensure public safety. The coalition believes that the 32.5 grade of cement which many cement manufacturers in the country have been producing and supplying to the consumers instead of the higher 42.5 grade is partly responsible for the increasing incident of collapsed building across the country. They blamed the dangerous development on lax regulation by the Standards

Organisation of Nigeria (SON) and called on it to ensure that cement manufacturers produce the standard 42.5 grade. The concern over sub-standard cement is weighty and must not be overlooked because as a developing country, a lot of development projects and construction works go on all the time with cement as the major material; be it residential houses, public buildings such as schools, markets, hotels, airports, roads and bridges among others. Ultimately, any failure of a major construction component such as cement due to compromised standard can as always only result in tragic loss of invaluable human lives, and properties which we can ill afford. Unfortunately, the alarm sounded by the civil society groups over sub-standard cement which should be a timely wake-up call for the government regulatory agencies, cement manufacturers and other stake holders to do the right and needful thing has been turned into needless controversy with different parties seeking to justify themselves. This newspaper, nevertheless, commends the civil society groups and their allies for their proactive life-saving advocacy aimed at preventing the kind of agonizing human tragedies such as this nation has witnessed too often to our chagrin. Expectedly, the regulatory watchdog in the eye of the storm, the standards organization of Nigeria, (SON), the Cement manufacturers Association of Nigeria, the Nigerian Institute of Building (NIOB), and the Block building Association of Nigeria (BBAN), have made inputs into the cement debate which would go a long way in enlightening the public and the stakeholders on the issues involved with a view to charting the right way forward. The Director General of the standards Organisation of Nigeria (SON), Dr. Joseph Odumodu was quick to clear his organization, and cement manufacturers, saying that there is no sub-standard cement in the Nigerian market. He explained that the 32.5, 42.5 and 52.5 grades of cement are supposed to be used for different purposes. Illuminating further, he said while the 32.5 is suitable for block making and plastering or rendition, 42.5 is suitable for concrete, high rise structures, bridges, flyovers and marine construction, adding that there is widespread ignorance of the of the different uses of the various grades of cement even among professionals of many years standing in the building industry! The SON Director also raised vital issues of undue exposure and expired cement being responsible for poor quality or standard of cement in the country. According to him, when cement is unduly exposed, the quality may diminish giving false impression of cement being of law quality at the point of manufacture, "Cement has a lifespan and if it goes beyond the lifespan it will fail to meet it parameters…there is a huge gap between what is put in the market and what the consumers take up." This is unnecessary controversy over a serious issue which the public and all stakeholders need clear policy direction from the Standards Organisation of Nigeria (SON). We are not impressed that SON was too quick to give a sweeping clearance to cement manufacturers in the country vouching that their products are of the right standard always given the tendency of entrepreneurs to cut corners when not adequately monitored. Indeed, how could all the producers have been absolved of the accusation of varying product pigmentation in favour of lawer grade cement without thorough investigation?The objective of the paper is to explore the contending theses on cement classification with a view of supporting the position of Standards Organisation of Nigeria (SON) in re-positioning the cement industry and allied industries. To achieve this objective, the first section of the paper discusses in a thematic form the contending classification of cement using its major compositions and performance. The second section addresses the factors that led to the constitution of constituting a Technical Committee by the Standards Organisation of Nigeria (SON) to address the challenges. The final segment offers recommendations and concludes the paper.

Theoretical Perspective

Classifications of Cement: A Thematic Exposition

Two basic approaches are normally used to classify cements. According to Jackson (2004:25), "the first is in respect of their composition and the second is in respect of their performance- related properties". The major countries that have contributed to the classification of cement include Austria, Belgium, Denmark, Finland, France, Germany, Greece, Denmark, Iceland, Italy, Luxembourg, Netherland, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom and the United States. We also discussed other ten types of cement which include: Ordinary cement; Rapid heat cement; Law heat cement; Portland blast furnace cement; High alumina cement; Expanding cement; Quick setting cement; Air & trading cement; Hydrophorbic cement and White cement. Table 1.1.1 belaw shows the various classifications of cement by composition and performance.

Table 1.1.1: Cement Classification

Type		Designation	Notation	Main addition		Main Application	Main contra-indications
CEMENT				Type	% by mass		
I	Portland without any main addition	Portland cement	CEM I	-	-	Concrete and precast concrete with high or very high strength. Special public works made of processed concrete.	Works made in aggressive environments. Mass concrete applications and structures prone to shrinkage cracking.
II/A	Portland cement with law content of main addition	Portland slag cement	CEM II/A-S	S	6-20	General purpose, high or medium strength mortar, concrete and precast concrete.	Works made in aggressive environments, depending on type and amount of the addition.
		Portland silica fume cement	CEM II/A-D	D	6-10		
		Portland natural pozzolana cement	CEM II/A-P	P	6-20		
		Portland natural calcined pozzolana cement	CEM II/A-Q	Q	6-20		
		Portland siliceous fly ash cement	CEM II/A-V	V	6-20		
		Portland calcareous fly ash cement	CEM II/A-W	W	6-20		
		Portland burnt shale cement	CEM II/A-T	T	6-20		
		Portland limestone cement	CEM II/A-L	L	6-20		
			CEM II/A-LL	LL	6-20		
		Portland composite cement	CEM II/A-M	S/D/P/Q/ T/W/L/LL	6-20		
II/B	Portland cement with moderate content of main addition	Portland slag cement	CEM II/B-S	S	21-35	General purpose, medium or law strength concrete and mortar	Works in aggressive environments, depending on type and amount of addition.
		Portland natural pozzolana cement	CEM II/B-P	P	21-35		
		Portland natural calcined pozzolana cement	CEM II/B-Q	Q	21-35		
		Portland siliceous fly ash cement	CEM II/B-V	V	21-35		
		Portland calcareous fly ash cement	CEM II/B-W	W	21-35		
		Portland burnt shale cement	CEM II/B-T	T	21-35		
		Portland limestone cement	CEM II/B-L	L	21-35		
			CEM II/B-LL	LL	21-35		
		Portland composite cement	CEM II/B-M	S/D/P/Q/ T/W/L/LL	21-35		

III	Blasfurnace cement	Blastfurnace cement	CEM III/A	S	36-65	Concrete in agressive environments (sulfates in soils, agressive or sea water, etc). Equivalent to SR type	Works where proper care cannot be guaranteed or where aesthetics is important. Concrete work at law temperatures.
			CEM III/B		66-80		
			CEM III/C		81-95		
IV	Pozzolanic cement	Pozzolanic cement	CEM IV/A	D/P/Q/V/W	11-35	General purpose concrete and mortar, especially in moderately agressive environments, due to pure water, or slightly acidic or carbonated water. Concrete for hydraulic structures. Concrete with alkali-reative aggregagates.	Works in very aggressive environments.
			CEM IV/B		36-65		
V	Composite cement	Composite cement	CEM V/A	S/P/Q/V	18-30	Soil stabilization. Soil cement, gravel cement and road bases. Dry compacted concrete for dams or mass applications.	When it is not recommmended.
			CEM V/B		31-50		
LAW EARLY STRENGTH BLASTFURNACE CEMENTS (Suffix L) UNE-EN 197-4:2005		Blastfurnaces cement of law early strength	CEM III/A	S	36-65	Same as CEM III, but for mass concrete works (compacted concrete dams)	Same as CEM III.
			CEM III/B L		66-80		
			CEM III/C L		81-95		
VERY LAW HEAT SPECIAL CEMENTS (Preffix VHL) UNE-EN 14216:2005		Blastfurnace cement	CEM III/B	S	66-80	Same as the corresponding CEM, but in mass concrete works (compacted concrete dams).	Same as the corresponding CEM.
			CEM III/C		81-95		
		Pozzolanic cement	CEM IV/A	D/P/Q/V/W	11-35		
			CEM IV/B		36-65		
		Composite cement	CEM V/A	S/P/Q/V	18-30		
			CEM V/B		31-50		
WHITE CEMENTS (Preffix BL) UNE 80 305:96		White portland cement with additions	BL I	S/D/P/Q/ T/W/L/LL	0-5	High or very high strength concrete and precast concrete. Special mortars (single layer).	Analogue to CEM I and CEM II cements.

	White portland cement with additions	BL II	S/D/P/Q/ T/W/L/LL	6-25	Medium or high strength resistance concrete and precast concrete. Special mortars (single layer).	
	White masonry portland cement	BL 22,5 X	S/D/P/Q/ T/W/L/LL	26-60	Floors, pavements, renders, stuccowork, masonry, etc.	Forbidden for structures.
SPECIAL CEMENTS (Preffix ESP) UNE 80307:2001	Cements for special uses	ESP VI-1	S/P/V	45-75	Analogue to CEM V cements and specially for roadways (pavements, bases, subbases) and dams.	When it is not recommended.
CEMENTS WITH ADDITIONAL FEATURES (Suffixes)	**UNE 80303-1:2001** Sulfate-resistant cements	/SR			Presence of sulfates or sea water. Fundations in gypsum-rich soils. Marine structures in especially agressive environments.	According to the cement type and subtype.
	UNE 80303-1:2001 Sea water-resistant cements	/MR			Contact with sea water. Marine structures.	
	UNE-EN 197-1:2000/A1:2005 Law heat cements	/LH			Law shrinkage concrete. Concrete work performed in hot weather. Mass concrete applications (dams).	
MASONRY CEMENTS UNE-EN 413-1:2005		MC 5	S/D/P/Q/ T/W/L/LL	≤ 75	Masonry mortar.	When it is not recommended.
		MC 12,5				
		MC 12,5 X		≤ 60		
		MC 22,5 X				
CALCIUM ALUMINIUM HYDROXIDE DERIVATE CEMENTS (CAC/R) UNE-EN 14647:206	Calcium aluminate cements	CAC/R	Only made of calcium aluminate, without any addition		Refractory concrete and mortar. Aggressive environments (sulfates, sea water or slightly acidic water) and specific purposes.	When it is not recommended.

Key

K - Clinker

S - Blast-furnace slag

D - Silica fume

P - Natural

Q - Industrial

V - Siliceous

W - Calcareous

T - Burnt

L - Limestone

Source: Technical Mineralogy Department of Geosciences (2010)

Meanwhile, cement can generally classified as either natural or artificial. The natural cements are obtained from natural materials having a cement-like structure and require only calcining and grinding to yield hydraulic cement powder. Artificial cements are available in large and increasing numbers. Each type has a different composition and mechanical structure and has specific merits and uses. Artificial cements may be classified as Portland cement (named after the town of Portland in the United Kingdom) and aluminous cement. There are about 27 types of cement but we shall discuss the ten most common ones.

1. Ordinary cement: This type of cement is used a lot today, and is still known as ordinary Portland cement. It is ground up into a powder to form. Ordinary cement is used in domestic houses and where no specific requirements are needed.

2. Rapid heat cement: They generate more heat in the early stages and can be useful in cold weather concreting as either rapid-setting or extra rapid hardening may be.

3. Law heat cement: Law Heat Cement complies with AS 3972 and Special Purpose Type LH/SR. It is manufactured from the ingredients of specially selected cement clinker and ground granulated blast furnace slag that result in significantly lawer heat generation during the process of hydration than the comparable Portland cement. Law heat cement is used when there are large pours because the heat of hydration will affect the final curing temperature. In mass concrete works like construction of dams, heat produced due to hydration of cement will not get dispersed easily. This may give rise to cracks. Hence in such constructions. It is preferable to use law heat cement. This cement contains law percentage (5%) of tri-calcium aluminate (C3A) and higher percentage (46%) of di-calcium silicate (C2S).

4. Portland blast furnace cement: The granulated slag made by the rapid chilling of suitable molten slag from blast furnaces forms the basis of another group of constructional cements. In the manufacture of pig iron, slag comes out as a waste product. By grinding clinkers of cement with about 60 to 65 per cent of slag, this cement is produced. The properties of this cement are more or less same as ordinary cement, but it is cheap, since it utilize waste product. This cement is durable but it gains the strength slawly and hence needs longer period of curing. A mixture of Portland cement and granulated slag, containing up to 65 percent slag, is known in the English-speaking countries as Portland blast-furnace (slag) cement. Portland blast furnace cement is either pulverised fuel ash or ground granulated blast-furnace slag both of these reduce the heat of hydration.

5. High alumina cement: It is manufactured by calcining a mixture of lime and bauxite. It is more resistant to sulphate and acid attack. It develops almost full strength within 24 hours of adding water. It is used for under water works.

6. Expanding cement: Expanding and non-shrinking cements expand slightly on hydration, thus offsetting the small contraction that occurs when fresh concrete dries for the first time. Expanding cements were first produced.

7. Quick setting cement: Rapid cure allaws for quick access to repaired areas. Garonite anchoring cements sets and expands rapidly, curing twice as strong as concrete in one hour. Quick setting cement is used when the pour has to happen fast. Quick setting cement is produced by reducing the percentage of gypsum and adding a small amount of aluminium sulphate during the manufacture of cement. Finer grinding also adds to quick setting property. This cement starts setting within 5 minutes after adding water and becomes hard mass within 30 minutes. This cement is used to lay concrete under static or slawly running water.

8. Air & trading cement: This type of cement holds bubbles of air in it and has a porous finish so water can seep through it.

9. Hydrophorbic cement: Cement is a hydraulic bonding agent used in building construction and civil engineering. It is a fine powder obtained by grinding the clinker of a clay and limestone mixture calcined at high temperatures. When water is added to cement it becomes slurry that gradually hardens to a stone-like consistency. It can be mixed with sand and gravel (coarse aggregates) to form mortar and concrete.

10. White cement: White Portland cement is readily available throughout North America. It has essentially the same properties as gray cement, except for color, which is a very important quality control issue in the industry. The color of white cement depends on raw materials and the manufacturing process. It is the metal oxides (primarily iron and manganese) that influence the whiteness and undertone of the material. White cement is manufactured to conform to ASTM C 150, Specification for Portland Cement. White cements produce clean, bright colors, especially for light pastels. Many different colors can be created by adding pigments to concrete made with white Portland cement. Two or more pigments can be combined to achieve a wide range of colors. White cement (or a mixture of white and gray cement) can be specified to provide a consistent color of choice. An even greater variety of decorative looks can be achieved by using colored aggregates and varying the surface finish treatment or texture. White cement, is used so that you do not have to paint over the finish produce.

The strength of each is different and the strength of a particular mix depends on a lot of factors. The strength goes down when you increase the water/cement ratio. To find the strength of a concrete you must do a test, the cube test is the most common. Here you make concrete cube and crush.

Portland cement

Portland cement is the most common type of cement in general usage. It is the basic ingredient of concrete, mortar and most non-speciality grout. The most common use for Portland cement is in the production of concrete (ASTM, 2000a). Concrete is a composite material consisting of aggregate (gravel and sand), cement, and water.

Types of Portland cement

The ASTM has designated these types of Portland cement (ASTM, 2000b). Physically and chemically, these cement types differ primarily in their content of C3A and in their fineness (Smith). In terms of performance, they differ primarily in the rate of early hydration and in their ability to resist sulfate attack. The general characteristics of these types are listed in Table 1.1.2.

	Classification	**Characteristics**	**Applications**
Type I	General purpose	Fairly high C_3S content for good early strength development	General construction (most buildings, bridges, pavements, precast units, etc)
Type II	Moderate sulfate resistance	Law C_3A content (<8%)	Structures exposed to soil or water containing sulfate ions
Type III	High early strength	Ground more finely, may have slightly more C_3S	Rapid construction, cold weather concreting
Type IV	Law heat of hydration (slaw reacting)	Law content of C_3S (<50%) and C_3A	Massive structures such as dams. Now rare.
Type V	High sulfate resistance	Very law C_3A content (<5%)	Structures exposed to high levels of sulfate ions
White	White color	No C_4AF, law MgO	Decorative (otherwise has properties similar to Type I)

Source: American Society for Testing and Materials, 2000b

The differences between these cement types are rather subtle. All types contain about 75 wt% calcium silicate minerals, and the properties of mature concretes made with all types are quite similar. Thus these types are often described by the term ordinary Portland cements (OPC).Types II and V of OPC are designed to be resistant to sulfate attack. Sulfate attack is an important phenomenon that can cause severe damage to concrete structures. It is a chemical reaction between the hydration products of C3A and sulfate ions that enter the concrete from the outside environment. The products generated by this reaction have a larger volume than the reactants, and this creates stresses which force the concrete to expand and crack. Although hydration products of C4AF are similar to those of C3A, they are less vulnerable to expansion, so the designations for Type II and Type V cement focus on keeping the C3A content law. There is actually little difference between a Type I and Type II cement, and it is common to see cements meeting both designations labeled as "Type I/II". Type III cement is designed to develop early strength more quickly than a Type I cement. This is useful for maintaining a rapid pace of construction, since it allaws cast-in-place concrete to bear loads sooner and it reduces the time that precast concrete elements must remain in their forms. These advantages are particularly important in cold weather, which significantly reduces the rate of hydration (and thus strength gain) of all Portland cements. The downsides of rapid-reacting cements are a shorter period of workability, greater heat of hydration, and a slightly lawer ultimate strength.Type IV cement is designed to release heat more slawly than a Type I cement, meaning of course that it also gains strength more slawly. A slawer rate of heat release limits the increase in the core temperature of a concrete element. The maximum temperature scales with the size of the structure, and Type III concrete was developed because of the problem of excessive temperature rise in the interior of very large concrete structures such as dams. Type IV cements is rarely used today, because similar properties can be obtained by using blended cement.White Portland cement (WPC) is made with raw ingredients that are law in iron and magnesium; the elements that give cement its grey color. These elements contribute essentially nothing to the properties of cement paste, so white Portland cement actually has quite good properties (Smith, 2003). It tends to be significantly more expensive than OPC, however, so it is typically confined to architectural applications. WPC is sometimes used for basic cements research because the lack of iron improves the resolution of nuclear magnetic resonance (NMR) measurements. Although Types I, II, III, and white cements are the commonly produced cements, Nigeria produce largely though not exclusively Types I.

Setting the Standards for Cement Production in Nigeria

Dangote Cement let everybody know in March 2014 that it is now producing 52.5MPa grade cement in Nigeria. The move was a response to building pressure from professional and civil groups in the country which have reacted in recent months to the high incidence of building collapses in the country. With the 42.5MPa grade looking likely to become the new legal standard, Dangote's adoption of an even higher standard looks like canny marketing. The background to this tussle lies in the spate of building collapses that have plagued Nigeria in recent years. A widely cited paper in the Global Journal of Researches in Engineering from 2010 reported at least 26 incidents in Nigeria between 1975 and 1995 with 226 fatalities. Later figures from 2004 to 2006 reported at least 10 incidents with 243 fatalities, a significantly higher prevalence than in the earlier period. The paper recommended adopting standards for building materials such as cement among other measures. Since the publication of this paper news reports have been hard to collate. Commentators placed the toll at 15 collapses with 30 fatalities for the first eight months of 2013 alone (Ezeibe, 2013). The Standards Organisation of Nigeria (SON) reacted to the latest outcry over building collapses by saying that they were caused by poor application, such as a using the wrong quality of cement for a particular task, not poor standards. According to the SON, 32.5MPa grade cement is recommended for activities such as plastering, flooring, block moulding, culvert making and building simple domestic houses. 42.5MPa grade is designed for the construction of tall buildings, bridges and load bearing columns. Adopting a national standard of 42.5MPa grade is intended to stop misuse of lawer grade cement being used for the wrong applications. One example commentators have mentioned is how to help illiterate builders select the right kind of cement for a given task.The Director-General, Standards Organisation of Nigeria, Dr. Joseph Odumodu, had said the issue of cement standard in the country has been politicised. According to Odumodu, who spoke at a cement stakeholders' meeting in Lagos recently posited that this should not be the case. He said, "When standards are compromised, it leaves consequences such as the loss of properties and investment

as well as the loss of lives" (Azuh, 2014:8). The SON boss added that the development had prompted the meeting of a Technical Committee, which he said would help the stakeholders to make informed decisions. He said the deliberations would help in the formulation of new standards for cement, which would end building collapse in the country. The committee is expected to produce a new standard for cement follawing the debate on standards that has been ongoing for the past few months. The meeting, which was at the instance of SON, had representation from different professional, and business groups, including the Manufacturers Association of Nigeria, Council for the Regulation of Engineering in Nigeria, Raw Materials Research and Development Council, Cement Manufacturers Association of Nigeria, and Nigerian Building and Road Research Institute. Cement manufacturing companies that attended the meeting included Dangote Cement Plc, Ibeto Cement and Lafarge Cement WAPCO Nigeria Plc. Odumodu said, We are here to look critically at the issues and factors affecting the sector, especially building collapse, of which cement is a factor. The essence is to ensure that Nigerians no longer die from avoidable deaths through ignorance and negligence. Something tells me that we will be able to find a solution to this problem at hand. And that is why I appeal for people to be dispassionate in their contributions. The business of cement is not about profit making, but standards must be ensured (Alli, 2014:8).Opening the technical session with a charge, the Director General of SON, Dr. Joseph Odumobu, did not mince words about the federal government's expectations from the Committee. He said: We have seen a lot of building collapse in the country and we know that most of these have caused avoidable deaths and we cannot allaw it continue. So in this meeting, we expect to get expert technical insights on the way forward in standardisation of cement. The media has being awash with varied information about different classes of cement and so to bring succour to Nigerians, we have brought together a critical mass of knowledgeable experts to provide direction on the issue. Many questions have been asked by Nigerians that need answers. To be sure, there is no substandard cement produced in Nigeria because we have cement standards well elaborated in the country. But there are issues that must be addressed. For example, SON has established that people in the country, who go to the market to purchase cement for one construction activity or the other, do not actually know what they buy from the market. When the whole controversy began, we embarked on a basic survey and administered questionnaire to different people who are stakeholders in the building and construction industry, asking basic questions and the response revealed that the people did not actually know what they were buying from the market. When they get to the market they just ask for a cement and at best they ask for a particular brand name of cement. This invariably leads to misapplication of the product and to check this unfortunate situation, we have put this committee together (Alli, 2014:9).Odumodu said to ensure that the best result is achieved with the technical committee initiative, SON had made sure that a cross section of all relevant organisations were invited to participate in the exercise. The membership of the technical committee was drawn from University of Nigeria Nsukka (UNN), Council for the Regulation of Engineering in Nigeria (COREN), Manufacturers Association of Nigeria (MAN), Cement Manufacturers Association of Nigeria (CMAN) and Nnamdi Azikiwe University. Other members of the committee are Lafarge Cement WAPCO, Dangote Cement, UNICEM, Ibeto Cement, Julius Berger, Building Collapse Prevention Guild, the Federal University of Technology, Minna and the University of Lagos. The National Association of Block Moulders, Raw Materials Research and Development Council (RMRDC), the Nigeria Building and Road Research Institute (NBRRI) and the Nigeria Society of Engineers (NSE) among others, are all members of the technical committee. Odumodu said in the course of the exercise, various questions would be asked and answers provided, stressing that the committee would be trying to ascertain the relationship between poor quality cement and building collapse in the country. The SON boss said even though it was clear that the problem of building collapse was beyond the mandate and scope of the committee and SON alone, they will still put in their best to ensure that every step necessary to check the scourge is taken by the committee beyond the call of duty. According to Odumodu, We are all aware how the game is played and we know that it is usually carried out by those who build for commercial purposes in sub-urban/rural communities. How many times have we heard about building collapse in Ikoyi, Victoria Island, Asokoro or Maitama? Because usually, people building in these areas follaw due process but the process is usually violated by shylock, illiterate and unskilled operators who mostly build for commercial purposes (Azuh, 2014:8).

Explaining further, Devakumar Edwin, Group Managing Director/ CEO, Dangote Cement Plc, recently said, "Over 90 per cent of consumers are not aware of the different types of cement available in Nigeria. Their expectations in respect to the performance of cement are the same regardless of the types. Giving a breakdown of the different grades of cement available, he noted that 92 per cent of Portland cement produced in the United States (US), are in 52.5 and 42.5 grades, while other imported cement from China, Japan, Denmark and Paris are all 42.5 grade. Corroborating to this, the Director General of Standards Organisation of Nigeria, Joseph Odumodu, said although there are standards currently in operation in the country with reference to cement grades but the challenge is that people do not know what brand and quality of cement they buy. For him, "People just ask for cement without bothering what brand and what quality they are buying; this problem is made more challenging by the fact that a lot of people in the building construction industry are illiterates" (Daily Sun Editorial, 2014:12). He said while manufacturers are mandated to comply with specifications of the standards, consumers themselves needed to play their own parts as is the case elsewhere in the world where consumers mandate standard. According to him, Nigeria has three grades of cement with various degrees of strength which include: 32.5; 42.5 and 52.5 pointing out that the public is not even aware of the variety in grades, standards and specific applications of cement. He said what most people are aware of brand names, whereas the grades are equally important. This ignorance he said has led to the misapplication of cement by many users, citing the point that some people for reasons of personal gain may utilize just one bag of cement for as much as 50 to 80 blocks rather than between 25 and 30 blocks. He adds, "More surprisingly, many acclaimed experts in the sector are also not aware of these cement varieties and standards. This law level of awareness has contributed to the wide spate of building collapse, as well as avoidable hazards in the construction sector" (Daily Sun Editorial, 2014:12). He explained further that while the 32.5 grade is suitable for plastering, block making and light concrete activities while others (42.5 and 52.5) are suitable for heavy concretes, flyovers and marine constructions, among others. The point is if you use a grade meant for one aspect of construction for another aspect, there would be problem. And those are some of the areas we are devoting attention. The 52.5 higher grade of cement was introduced into the market barley three months ago by Dangote Cement Plc. Engr. Joseph Makoju, Honorary Adviser to the President of Dangote Group, Aliko Dangote, described the introduction of the new cement grade by the company as ground breaking, saying Nigeria is now one of the best quality producers of cement in the world. No matter the sophistication of the structure, this is the best grade for any civil construction. Dangote did not create the standard. The standard has been there, we have only blazed the trail by starting its production. It is good for lead bearing columns. He further noted that with this development, none should complain again about law quality cement in the country or make excuses to bring in imported cement into the country (Daily Independent Editorial, 2014:21). Devakumar Edwin added: "For the past three months we have test-run the new products and it is now available in the markets. In the second half of this year, we are coming out with yet another new superior product" (Daily Independent Editorial, 2014:21).Although the committee's task was to review the standards, it needs to touch on the secondary issue of skills within the consumer segment. A member of the committee told one of the Nigerian magazine that one possible outcome of their meeting would be bolder inscription of the various specifications on every bag of cement and their uses. Over time, Nigerians who use the product have been largely uniformed about the grades and their uses. Odumodu has oftentimes explained that the 32.5 grade is meant for plastering, block making or light concrete; the 42.5 for heavier concrete, columns and decks; while the 52.5 grade is for bridges, culverts, and heavy load-bearing structures. One of the challenges facing the construction industry is that in some cases, a bag of the lawest grade of cement in the market could be used to produce more than the specified number of blocks it can produce. This is a common practice among block moulders and which is unknown to most end users.The committee may need to explore pubic awareness and standards advocacy as part of the SON's sensitization efforts. It is also expected to approach the main challenge with consumers' interest in mind above the narrow interests of the various groups. It is expected that the committee will achieve harmonization by bringing the cement manufacturing industry to a better standard than it has been. Although cement manufacturing has proven to be one of the most successful in the nation's manufacturing sector, stakeholders in the economy still believe it is possible for Nigeria to enter and dominate the ECOWAS market and beyond. However, that can only be achieved if the bickering over standard and quality is resolved.Just a few weeks after the dust raised by claims that the 32.5 grade of cement in the building and construction industry is partly responsible for building collapse in the country, Dangote Cement announced the completion of the calibration of its factories across the country to produce the 52.5 grade of the product, making it the first cement company in Africa to

get to that level. Industry analysts believe that the process of upgrading the company's factories must have been on long before the controversy broke out. It is for this reason that some stakeholders are accusing Dangote Cement of inciting civil society groups against other manufacturers in order to gain market advantage.At the height of the controversy, the management of Dangote Cement had said that it produces only 42.5 grade of cement but other cement makers tried to explain that the 32.5 grade, which many of them produce, does not posed any threat in the building and construction industry. Representatives of Ashaka Cement Company of Nigeria and United Cement Company insist that the 32.5 grade has been in use in the industry in the last 54 years and that limiting product choices will not be good for the consumer and will send the industry backwards and away from current international trend.Aside from Dangote, Ibeto Cement, a major importer of bulk cement, also trades on the 42.5 grade. The reason is that even in other parts of the world where the 32.5 grade is produced, that particular grade is not meant for export. For the first time, Dangote Cement and Ibeto, which have for years been engaged in cut-throat competition in cement business, seem to be speaking with one voice because of their profit motive. That was the scenario at a closed-door session of the meeting. If the Technical Committee set up by SON eventually phases out the 32.5 grade of cement, catching up with Dangote and Ibeto may come to the other competitors at a huge cost as they would have to upgrade their plants to produce the higher grades. It may also lead to a temporary loss of consumers' confidence in these other manufactures and, by extension, shrink their market share and profit in subsequent financial years. That is why they seem to be combative at the committee meetings. But as the bickering rages, consumers can not wait for the good times to come. Already, in Lagos there is excitement over the making of the Consumer Rights law and the establishment of the Consumer Rights Agency. The law is one that Babatunde Fashola, governor of the state, hopes every consumer will benefit from in view of the fact that it does not only raise the service and compliance level, but also improves the quality and standard of goods and services that are put in the market. For the manufacturers and service providers, the new law in Lagos will bring to mind the fact that consumers have been empowered to challenge violation of their rights.The state government said it was inundated with complaints from consumers concerning poor service delivery and influx of sub0standard products, and that prompted the establishment of the rights agency and the making of the Consumer Rights Law. "Consumers no doubt have been on the receiving end of service and product providers and have been unable to seek redress as it is done in other climes. So we take it as a duty to help consumers get value for their money," said Seye Oladejo, special assistant to the governor on commerce.The state government also seeks to provide an alternative medium to settling dispute among consumers, service providers and manufacturers without necessarily resorting to the courts. Of particular interest to consumers is how the new law will affect poor services, hidden charges, irregular billings and several others, especially be banks and telecommunications companies. But the government says it will rely on consumers to come up with their complaints. The consumers need to visit he agency with proof of what transpired and such petitioners will be expected to come with facts, figures, dates and receipts of the business transaction. The agency would also want consumers to come up with other relevant information that will help in addressing the issues raised.The level of awareness of the consumers may pose a challenge to the new law and rights agency. However, the state government has promised a continuous process of sensitizing the public by organizing interactive session between consumers and service providers, which is already in existence, especially for the telecoms sector.The building sector will also benefit from the new law in Lagos State. According to Bosun Jeje, the state's commissioner for housing, When we observed the increasing cases of building collapse in the state, we set up Lagos state material testing agency that takes samples of defective buildings across the state to the laboratory to confirm if the materials used are standard or substandard (ThisDay Editorial, 2014:45). Also, the Lagos Building Control Agency officials go round to ensure specifications are follawed by builders who had obtained approval from the agency. Where building materials are found to be substandard, the officials evacuate the people living in the house and pull down the building. However, the government pays for all expenses incurred in the process.From the beginning of a building construction, the agency ensures that the builder gets approval from the Ministry of Physical Planning for their building survey even before the foundation level. At that point, what the government agency does is to educate builders on the quality of the materials that are suitable for the project. They do not stop at that. After the approval has been given, officials of the agency will then go round the state to ensure these specifications are complied with. According to the new legislation, in the event that the specifications are not met and where substandard materials are discovered to have been used, the agency goes ahead to demolish the structure irrespective of the level of completion. In all, some of the processes may be discomforting to some

of the stakeholders, particularly in cement manufacturing and consumer rights, but the consumers will certainly have good reasons to be happy.

Conclusion

The Federal Government has finally scrap the 32.5 grade of cement and adopt the higher 42.5 grade as the minimum to be produced and distributed in the country, this came on the heels of deliberations by the technical committee convened by the Standards Organisation of Nigeria (SON) to review cement standardisation in the country. The Committee which sat in Lagos had stakeholders polarised along two major groups. One group had Lafarge Cement WAPCO, Ashaka Cement and Unicem, clamouring for the sustenance of the 32.5 grade of cement with the explanation that it had no consequence on the integrity of buildings, while the other group had Dangote Cement, which said it was ready to make any further investment as long as it would make Nigerians safer. Although Lafarge WAPCO possesses the capacity to produce the 42.5 grade of cement and above, their facilities are currently calibrated to produce 32.5 grade of cement to the tune of 80 percent of their capacity. What this means is that if the federal government goes ahead therefore to scrap the 32.5 grade of cement, it would mean that the cement company of French origin would have to make significant investment in the recalibration of its plants across the country to meet the new and higher standard. Dangote cement had already made the needed investment to produce the 42.5 higher cement grade and had also recently moved ahead to raise the standards by obtaining SON certification to produce the highest grade of 52.5. The paper addresses the background information that occasioned the reasons for the clamour for New Cement Standards. To achieve this objective, the study made use of the composition and properties of cement. After analyzing the cement war issues in Nigeria, the paper concludes by positing that going for the higher grade is always better on the side of caution and safety, rather than to take the chance of the possibility of future deaths from collapsed buildings.

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