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**COMPONENTS OF THE POLICY AND STRATEGY FOR THE DEVELOPMENT OF CONSTRUCTION  
 AND BUILDING MATERIALS INDUSTRIES**

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## COMPONENTS OF THE POLICY AND STRATEGY FOR THE DEVELOPMENT OF THE CONSTRUCTION AND BUILDING MATERIALS INDUSTRIES

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### I. PRELIMINARY CONSIDERATIONS

1. The improvement of the present position of the construction and building materials industries to the point where self-reliance is achieved between now and the year 2000 demands the formulation of consistent short-, medium- and long-term policies and strategies and the definition and establishment of adequate structures and machinery, in the absence of which the principles underlying the operation may fail to take practical form. However, if these requirements are to be met, it is essential that the leaders responsible for carrying out these task at all levels deliberately adopt certain approaches.

#### A. Simplicity and realism

2. There can be no doubt that from the outset it would be wise to focus on simple, practical and realistic solutions. By comparison with other industrial sectors, the construction and building materials sector is in a class by itself in that the range of possibilities where design and choice of techniques and products are concerned is so broad that in the end solutions which are inadequate and even ruinous are sometimes adopted because they seem to offer certain slight advantages, in some cases in areas which are utterly non-essential.

3. In the particular case of building materials, this state of affairs is rooted in a nearly total misconception on almost all sides of the nature of the materials used and their role in building. The qualities or characteristics which should be required of building materials depend entirely on the use to which each one is to be put. Are they intended to bear relatively heavy weights, to withstand a certain degree of pressure, to bind other materials, to provide protection against inclement weather conditions, to ensure comfort or beauty, etc.? In each case different conditions must be fulfilled. In view of the fact, for example, that in the one-storey buildings encountered almost everywhere in Africa the lowest components of the brickwork do not have to bear more than 2 kilograms per square centimetre of pressure, it is useless to require that such buildings be built of bricks made of baked clay, stabilized earth or a sand-cement mix capable of withstanding 100 or even 200 kilograms of pressure per square centimetre. The best proof of this is that houses build of dried clay (which offers resistance of about 20 kilograms per square centimetre) last almost indefinitely in a dry climate. The fact that in a wet tropical climate they break up after a certain time is less a matter of ability to withstand pressure than of ability to withstand the climate.

4. Where the need to adopt realistic solutions is concerned, the above example also provides an indication of the attention which should be paid to climatic constraints. Climate is a basic factor to which too much attention is attached in the case of some materials while it is relegated to a secondary position in the case of others. A flagrant example of this is provided by the various roofing materials with petroleum-residue base encountered on the African market, which are of course imported from Europe or elsewhere. It is true that these materials, whose esthetic value is undeniable, have in the cold countries proved to be solid and stable and good insulators

against the cold. The advertisements present them as being ideal for use in the roofing of socio-collective buildings, such as schools, dispensaries and workshops. Unfortunately, studies and experience in Africa have shown that they are very bad insulators against the heat and that their rating in terms of solidity and stability is low.

5. Sometimes too to protect a wall fully against the weather, it is covered with a special impermeable coat, one of the latest discoveries of chemistry. However, the fact is overlooked or perhaps unknown that a wall acts like a living being in that it needs to "breathe", i.e., to conduct all kinds of exchanges, thermo-hygrometric for example, with its environment. All is well when the African climate permits other chemical combinations to take place within the coating and this breathing is possible. If this does not happen, either the wall will gradually reject the coat which is suffocating it or it will "die" a slow "death", i.e., in time it will lose its physico-chemical and mechanical properties.

6. These few examples show how important it is for all those who work directly with building materials always to bear in mind the role of the different materials. This kind of knowledge will help to guide them in the formulation and application of a policy and a global strategy where both the importation and the local production of building materials are concerned.

#### B. Fresh ideas and an open mind

7. Probably the most powerful impediment to the development of local industries in general and of building materials industries in particular in Africa is the body of ideas and prejudices inherited from colonial times. Another impediment is what might be termed "permanent mental colonization" to which the stereotypes which make themselves felt every day give rise thanks to the extraordinary power of the exchange and communications media. Because of these ready-made notions, cement, concrete and glass summon forth the idea of a wealthy home and a prestige building; in rural areas, galvanized sheet-iron, is considered to be the mark of high standing despite its poor thermal and acoustical properties. Even in countries with immense forest potential, slum housing is usually made from packing cases in which products imported from Europe or elsewhere were shipped.

8. Conversely, the very expression "local material" evokes in many people the idea of the lowest grade of material good only for people with little or no income, most of whom live in rural areas. This is a false notion and should be corrected. Actually it is rare to find a material which occurs naturally and locally and is ready for use as it comes. All materials need to be manufactured by man out of natural primary or synthetic matter through the use of various techniques. Thus, in some countries cement, lime, baked brick, iron and other materials may be considered to be local building materials. The so-called "traditional" materials are simply the results of the "know-how" of the forefathers which have not been altered over the years. But is the word "traditional" necessarily depreciatory? Traditional materials unquestionably need to be improved to fulfil the requirements of the present age, and this is a consideration which should be entertained in a positive and dynamic frame of mind by everybody, especially the authorities.

9. Where the production of building materials is concerned, the same stereotypes have fostered the belief that the best techniques are necessarily the so-called "modern" techniques imported from the industrialized countries and designed for mass production

which is capital intensive. However, everyone knows that building materials, at least the basic products, are usually voluminous, unwieldy and heavy. They are always expensive to ship, even in the developed countries. Moreover, it is known that there is such a thing as an optimum distance between the source of the raw materials used and the factory. If these basic principles are applied to most African countries, where specific constraints are encountered (transport facilities and conditions, market size, the training of labour, job creation, the availability of capital, etc.), it is clear that it is absolutely essential for attitudes to change. In order to satisfy the needs of the majority of the people living in rural areas and on the outskirts of cities, it would seem necessary to adopt policies, strategies and programmes which are clear and bold enough to depict small industry and rural building materials industries as being something more solid and concrete than a mere topic of ephemeral and marginal philosophic discussion. If there is this change in attitude or concept and the notion that profitability is based on payments in hard cash is in the end overcome and the strategic importance of small industry and rural building materials industries in the African context is recognized, there is a good chance that it will be possible to develop the rural economy and improve the quality of life, especially in the rural and suburban areas.

#### C. Economy and rational use of building materials

10. In accordance with the stereotypes mentioned above, a real craze is gradually developing in Africa, and especially in the public sector, for the style of building found in the developed countries. Sometimes a building is condemned simply because it dates from a bygone era and spoils the image of distinction and prestige of the modern city. While a certain amount of scrap material of brick, iron, wood, glass, sheet-metal, etc., is inevitably to be found on building sites, when it exceeds a certain limit, it is a mark either of faulty design plans or of the heedlessness which comes from the spirit of over-consumption and waste commonly found in the industrialized countries and now unfortunately beginning to be felt in Africa. Thus, the properties of an excellent grade of cement, may for example, be completely disguised because the concrete is produced with poor quality gravel or sand or because the correct ration of ingredients is not observed. Building materials, and especially imported building materials, must be treated as precious articles and must be used appropriately and rationally. Thus, it would seem that the selection and use of building materials are the responsibility of more than one individual. The responsibility is shared by the State, the architects, the engineers, the workers, the merchants, etc.

#### D. Frame of objectives

11. While it is extremely difficult to formulate a policy and a strategy suitable for all African countries where the development of the construction and building materials industries is concerned, there is a vital need clearly to identify the basic principles involved in the light of the economic and social development objectives adopted by the African States. These objectives can be summed up as follows:

- (i) The deliberate promotion of a growing degree of self-reliance;
- (ii) The attainment of a capacity for independent growth;
- (iii) Diversification, generally through planned action.

Moreover, in response to a desire for effective action, the basic principles to be identified must necessarily be accompanied by provisions which, while of a general

nature, are at the same time sufficiently concrete, realistic and practical. In the absence of such provisions which may relate to institutional structures, various machinery and even to the methods to be used, it is impossible correctly to conduct the various phases (planning, co-ordination, implementation, supervision and evaluation) of any action undertaken in application of the basic principles.

12. The construction and building materials industries have always been characterized by the very broad range of resources which may be used (raw materials, energy, products, labour), of possible techniques (production of materials, construction of buildings and others) and of sectors they help to expand. Such a wide range of possibilities shows the selective and above all very original character which must be given to the basic principles and to the measures needed for their application in the African context. They must be planned out in such a way as to serve specific short-, medium- and long-term objectives. In addition to its other advantages, this step-by-step approach would make it possible at the national level to identify programmes capable of being understood by the majority of the population, whose enthusiastic participation, it should be pointed out, is indispensable to the success of the various projects conducted under these programmes.

13. Finally, at the national level, the basic principles and the measures needed to give practical expression to them, must reflect the feeling that the construction and building materials sector is the very best example of a field where any true progress presupposes action oriented towards solidarity among the various social strata and is above all aimed at satisfying the needs of the lowest stratum of the underprivileged in the rural and suburban areas. Similarly, self-reliance in this sector at the continental level cannot be envisaged outside the framework of the common destiny of the African people and without paying special attention to the problems of the least-developed and land-locked countries.

## II. POLICY AND STRATEGY COMPONENTS AT THE NATIONAL LEVEL

14. It can be affirmed without hesitation that the basic objective of the achievement of autonomy in the construction and building materials industries can, produce a number of results in the long term and of the national level, the most significant of these results are listed below:

- (i) The satisfaction of the need for dwellings, services and infrastructure of the greatest number of people;
- (ii) Control over the building sector and its intermediary production factors;
- (iii) Optimum use of the employment capacity in the building sector and the sectors related to it;
- (iv) Development of the social and cultural aspects of building and creation of a better situation from the point of view of human settlements, with a lessening of the disparity between town and countryside to an acceptable level;
- (v) The increased development of other industrial sectors thanks to the planning and integration of the construction and building materials industries;
- (vi) The satisfaction of other national needs with the help of the special benefits in which command over the intermediate production factors results.

The rapidity with which these results are achieved will depend on the degree to which the policies and strategies take account of a number of requirements, the most important of which are outlined below:

A. Need for effective planning

15. While building and works activities are growing relatively slowly but at a steady pace in the developed countries, in Africa the pace of their development fluctuates significantly. This situation is in large measure due to the public sector, which, in Africa, is usually the most important sector in as far as these activities are concerned. The construction, sometimes within a very short period of time, of some infrastructures or buildings which have not been provided for or programmed in development plans on time, causes the building sector to "overheat". Caught short, African leaders are often forced to have recourse to very expensive solutions which foreign firms are always ready to suggest to them. The consequences include a systematic drainoff of materials to be found on the local market to the building sites in question, the often ruinous importation of materials normally available locally and a large influx of rural labour, mostly unskilled labour, into these sites. This expansion of building activities is often followed by a severe recession entailing much laying off of hands, especially unskilled labour and those engaged in secondary trades, who then come in to town to swell the ranks of the unemployed. Another consequence of this practice is that the import firms as well as the local manufacturers of building materials are incapable of predicting the demand with any degree of certainty.

16. These difficulties are often aggravated by the fact that even in the cities, far too much building construction in the private sector is accomplished with absolutely no State control. An extreme example of this is the building which, in some countries, is accomplished by night or on week-ends, thereby presenting the authorities with a fait accompli. But in many cases such situations can probably be blamed on the inefficiency or carelessness of the State employees responsible for supervising such building.

17. To allow local building materials industries to draw up their own production programmes and to earn the confidence placed in them by their clients and by the State in particular, it seems indispensable that:

- (i) Provision be made at the national level for effective planning in the building and works sector;
- (ii) The State actually exert control over building activities, at least in urban areas;
- (iii) A system of co-ordination be established between the building and works industry on the one hand and the building materials industry on the other.

18. If this kind of co-ordination is to be effective, solutions must be found within each of these two industries to the difficulties and lacunae specifically mentioned elsewhere. <sup>1/</sup> It would be even better if in each country, systematic sectoral studies could be conducted and reviewed on a regular basis in both the building and works and the building materials industry. If that were done, each country would have fresh data available at all times, which would allow national or international experts to uncover lacunae and bottlenecks rapidly and to suggest the most appropriate solutions before it was too late.

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<sup>1/</sup> See Document No.1 entitled "Review of the construction and building materials industries in Africa" (E/CN.14/HUS/22).

19. In addition to the advantages mentioned above, such sectoral studies would enable:

- (i) The State more easily to determine how to apply an effective policy of supervision and reasonable import quotas in respect of building materials and their components;
- (ii) The competent authorities to formulate and arrange for the application of pertinent recommendations and objectives aimed at diversifying the range of building materials and at enlarging the local market in these products;
- (iii) Research institutions, acting on instructions from the State, meaningfully to identify the priority areas on which effort should be focused;
- (iv) All the parties concerned to obtain the information they need to formulate a comprehensive programme for the integration of the construction and building materials industries with the other sectors.

B. Need for real integration with the other sectors

20. Mention has already been made of the importance of the construction and building materials industries in the overall development of a country. <sup>2/</sup> There is, however, the danger that this importance may never be clearly perceived if by "construction" only the construction of dwellings is meant, i.e. if no account is taken of infrastructure and capital goods or of the services which relate to them, especially repair and maintenance services. Of course the relative importance of these subsectors on each other and in the general context of other socio-economic activities depends on the degree to which a country is developed. Moreover, since motivation and priorities vary depending on the countries or groups of countries concerned, the policies and strategies and the degree of integration of the construction and building materials industries may differ widely. Thus, in the developed countries of Europe and America, the determination of needs and hence of integration policies and strategies is dictated by basic equations, such as the following:

Household = participant in production = consumer = voter

21. According to this equation, the goods to be produced, including the products of the construction and building materials sector depend on the nature and capacity of the voter's consumption. Since it is possible to create certain consumer needs out of nothing and to exaggerate the importance of other needs, the risk is great that the construction and building materials sector, or at least some of the subsectors mentioned, will gradually lose their central position in the overall development of a country. When transposed to the African context, where conditions are of course different, such a scheme sometimes yields unexpected results. In some African towns families with ample incomes are forced to live in real slums, where they install their refrigerators and television sets, while their cars are parked somewhere across an ill-defined sand lot between the dwelling places and the roads on which motor vehicles can be driven. At the same time, food stuff rots in some villages while the helpless farmers look on because the only access route to the cities is in such poor condition that no shipper would venture out on it.

22. Such dramatic situations could be avoided if in the African context formulas such as the one which follows were substituted for the equations mentioned above:

Family = participant in production = development worker = beneficiary of the results of development.



23. Considering that most African countries derive their resources from agriculture such a formulation amounts to posing the problem first in terms of the integration of construction and building materials sector with the agricultural sector as a whole. Actually, the development of the construction and building materials industries depends largely on the development of agriculture and the agro-industries. Rural people will be unable really to participate in the improvement of human settlements in the countryside until:

- (i) They have acquired some independence in the production and consumption of basic foodstuffs;
- (ii) The marketing of surplus and industrial agricultural products provides them with sufficient means to purchase certain building materials, among other things;
- (iii) They willingly accept and adopt projects intentionally based on popular participation, which is a prerequisite for the success of any development programme in the rural areas.

24. Moreover, the development of agriculture and the agro-industries makes certain waste products (sawdust and wood cuttings and shavings, ground-nut shells, palm-kernel and rice husks, coffee pericarps, the pods of cocoa and other beans, etc.) available in large enough amounts for use either as raw materials or as fuels in the production of building materials. If these waste products are used as fuels, the ash may be recycled and used in the manufacture of fertilizer or soap. Such possibilities exist when, here again, the stress is deliberately laid on the production of building materials either in moveable facilities or in stationary units in carefully chosen sites throughout a country, depending on local conditions.

25. There is, on the other hand, no need to dwell on the impact which the development of the construction and building materials sectors has on the improvement of living conditions in rural areas. By producing goods (dwellings, infrastructure and services) and by raising the level and broadening the scope of the technology employed, especially in the small trades related directly or indirectly to building, the construction and building materials industries make it possible to reach adequate solutions to the problems impeding rural development. Moreover, the favourable conditions created by the development of this sector make it easier to implement some projects, such as those aimed at providing access to villages, moving and resettling populations or settling nomadic peoples. Such operations are in many cases essential to development programmes but often present difficulties or even prove impossible because of the exorbitant cost of building materials and the limited range of building techniques.

26. In considering the overall development of a country, sufficient attention is never given to the strategic importance of some materials which are essential for the development of other sectors. Some industries are in danger of never developing adequately or achieving satisfactory growth unless they produce those products which alone are capable of supplying the building materials industries. Reference has been made elsewhere <sup>3/</sup> to the iron, steel, glass, wood pulp, mineral and organic chemicals, sugar, oil, fatty matters, tanning and other industries, of which lime represents an important by-product. Moreover, the building materials industries have an important peculiarity in that they are practically the only industries which need to make use of various techniques which are the fruit of scientific knowledge in all fields, including mechanics, electricity, electronics, optics, thermology, statistics, chemistry,

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<sup>3/</sup> Ibid.

electrochemistry, biochemistry and biology. Their rational development would result in technological progress in all these disciplines, with all the possibilities for practical application this might entail. Moreover, since the variety of products produced by and manufacturing techniques used in building materials industries is very great (ranging from small rural units to large industrial complexes), another advantage which is certain to accrue from the development of the building materials industry is that it would greatly enhance the possibilities for the development and rapid expansion of the disciplines mentioned above because the variety of products produced by and manufacturing techniques used in building materials industries is very great (they range from small rural units to large industrial complexes). Finally, in a typically African context, originality could be furthered in many sectors if the special conditions obtaining in the countries in the region were taken into account. Examples of this would be the development of techniques for the production of iron or aluminium out of laterite, the rational use of montmorillonite and attapulgite, increasing technological capacity in connexion with the use of solar energy, etc.

### C. Need for the rational use of local resources

27. As has already been pointed out, one of the difficulties standing in the way of the development of the building materials industries in Africa is the high proportion of imported raw materials used. Not only are these materials often very expensive they are not delivered on a regular basis. Moreover, the way in which international trade is now organized leaves the door open to all forms of price inflation. Since the range of building materials is very broad and the cost of the investment required is modest if mostly small- and medium-capacity units are used, it should be possible to produce some building materials, such as baked bricks, stabilized soil blocks and lime and other intermediary binding materials, in all countries.

28. This does not, however, exclude other possibilities at the national level. The existence of such possibilities will depend largely on a solid knowledge of local resources. Unfortunately, geological prospecting is not conducted systematically in most African countries and mineral research usually concentrates on minerals which command a high price on the international market. Unless the policies and strategies adopted contain provisions which give high priority to learning the local potential in raw materials and energy resources, the development of national capacity in the production of building materials is likely to remain handicapped for a long time to come.

29. Another factor which seems very important is the rational use of local resources because, apart from forests which are renewable, always provided of course that certain precautions are taken, raw materials sources can be exhausted. This is why it is necessary to hold the highest quality raw materials in reserve for those industries which have the greatest need of them. Thus, for example, it should be possible to produce the lime used in building and in the various stabilization processes out of siliceous or dolomitic limestone or even dolomite. Pure limestone should wherever possible be used for the manufacture of cement or the special categories of lime required by the sugar, pharmaceuticals and other industries. The same is true of various sand deposits, which should be reserved for use by the glass industries. This stipulation in respect of basic raw materials also applies to energy. Countries with great forest potential should use charcoal made from saw-milling residue or secondary species. Some countries should concentrate on the use of agricultural waste products, such as the ones mentioned above, and others on using their resources in peat and other natural forms of carbon. Finally, an effort must be made to see that the use of resources is not abused to the point where the environmental balance is destroyed (excessive felling of trees, too much quarrying of natural gravels and the like). If

there were need to add weight to the argument that there is need for concerted action by State agencies responsible for planning and the implementation of plans on a continual basis, considerations such as those suggested above would serve that purpose.

D. Need for research at the national level

30. At present Africa has very few research institutions in the building materials field. The lacunae and difficulties mentioned or briefly analysed above, all of which help to make the building sector particularly costly for African countries, can for the most part be adequately solved only by means of well-organized research preparatory to the study of building materials, their production and use. For this reason, research in general and research into building materials in particular must no longer be considered to be a luxury confined to a few well-endowed countries. However, if research is to earn its letters patent of nobility and make an effective contribution to the building materials industry, specific targets must be set for it and a well-defined approach adopted.

31. In the first place, there is in fact less need to find the best ways of using the so-called "traditional" materials than there is first to identify the properties of materials needed for specific work in specific conditions and then to produce materials with those properties. In other words, materials research should begin by identifying the functional needs and should in that sense be practically oriented.

32. It should also develop the building materials and components industry through standardization and by carrying out studies in pilot units. Since most African countries have no technical standards or specifications in almost any field, research on materials might also provide an opportunity to begin the process of identifying and applying standards in other sectors of national activity.

33. Finally, since the building materials industry in general has no basic infrastructure and insufficient financial means to enable it to carry out its own research, the specialized research institutions should provide it with the logistic support it needs to solve its special problems.

34. For the sake of rationality and effectiveness, these objectives should be pursued at a number of levels since research is usually costly. At the national level and in the long term, each country should have a central research institute, whose establishment would be the responsibility of the State, although universities and industries should also play a part. Although the nature and volume of the work performed would depend on the means available, it would seem that the most realistic way of meeting the needs of a country would be through the performance of the following functions:

- (i) Testing and analysing locally produced and imported materials;
- (ii) Being solely responsible for testing the materials and some of the components to be used in large-scale projects in the public and private sectors;
- (iii) Collecting, analysing and interpreting data on local weather conditions so as to be able to pass on information to all those who deal with building problems in the country;
- (iv) Obtaining or formulating background documents containing information on materials for the benefit of government authorities, architects, engineers, development experts, contractors, workmen, traders and others;

- (v) Making a useful contribution to the study of the country's natural resources, especially by analysing samples and preparing data sheets and simple cards on each resources;
- (vi) Developing new materials and systems to meet specific functional needs. This would include such items as coatings and foundations adapted to difficult terrain;
- (vii) In so far as is possible, carrying out technological research aimed especially at the production of materials in small- or medium-capacity units on the basis of local resources;
- (viii) Helping government agencies to prepare plans for the development of local building materials industries;
- (ix) Co-operating with other national agencies and with international institutions in formulating standards, modular co-ordination projects and the like for the countries in the subregion or region.

35. These functions cannot be performed all at once, and long-term programming will be required. Moreover, since the potential of the individual African countries is in general rather limited, it is of the utmost importance to see that waste, in the form of an unnecessary overlapping of activities, for example, is avoided. With this in mind, it is suggested that the national research institutes might be erected on the foundations of the experimental laboratories operated in most countries by the Ministry of Public Works, the Highways Authority and the Housing Ministry. For the same reason, the national institutes should have a documentation service which is well enough organized to prevent them from embarking on research which has already been successfully completed in other countries.

#### E. Need to train local contractors, middle-grade technicians and skilled manpower

36. Mention has already been made <sup>4/</sup> of the very minor role which local contractors play in building and construction in both the public and private sectors. Three factors are primarily responsible for this failure on the part of nationals to participate in building activities:

- (i) Insufficient technical know-how;
- (ii) Insufficient managerial and organizational know-how;
- (iii) Lack of financial support.

37. Lack of financial support is usually due to the first two factors. Actually, local contractors are often incapable of completing the work assigned to them or of completing it on time because of their inability, for example, to make correct and realistic estimates or to organize and manage their firms properly. Because of this, neither foremen nor financial institutions are willing to support them. Obviously, large foreign firms can hardly be counted on to use materials produced since they put undue emphasis on the quality of the materials they use and prefer to import materials with which they are familiar. In the last analysis, it is the local contractors who will encourage the local production of materials since it is in their own interest to use such materials and to advise their use in the work contracted to them. It is therefore essential to the development of the building materials industries that these contractors be trained (or be given advanced training). This training might be conducted at the subregional or regional level in courses offered periodically in specific subjects.

38. The training and periodic retraining of middle-grade technicians and workmen is equally essential. Because they are usually trained in the use of the so-called "Traditional" materials, they have great difficulty in working with new materials and show no enthusiasm for them. At the same time, they clearly exert an influence in the adoption of some materials. This accounts, for example, for the use of sand-cement bricks, which despite their poor quality, are singularly common, particularly in the West African countries. These technicians could be trained or retrained in special courses offered at the engineering schools which exist in most African countries. It goes without saying that these schools should be compelled to include in their curriculum courses designed to familiarize students with new materials developed at the national or regional level and with the way in which they should be used and their potential.

F. Need for more appropriate technology and project study

39. Most African building materials industries operate on the basis of technologies imported from highly industrialized countries. Although it is true that in the case of some materials like window-glass, the choice is at present rather limited, it is equally true that in the case of other materials, especially those in most common use, such as baked brick, lime and cement, the range of technologies fairly broad. If a wise choice of production technology is not exercised from the beginning, the result may be startling. Let us take, for example, the need to import raw materials which meet certain criteria when materials which are equally good but have slightly different properties are available locally, the stoppage of a factory for some time because a small part which is difficult to procure has been lost or because the automatic control system has broken down, having recourse to an expensive source of energy when a cheaper source is available locally or the shelving of a whole facility and the need to acquire another because the first one turned out to be ill-adapted to the local raw material.

40. As for project study, at present it is almost always handled by firms of foreign consults. It is often expensive and sometimes turns out to be not so viable as hoped because careful consideration has not been given to local conditions. Moreover, African countries tend to purchase equipment which costs as little as possible because they cannot afford to pay more, and they are therefore frequently advised to purchase second- or third-hand equipment which in some cases has merely been repainted to make it look like new. After it has been in use for a few years, a series of breakdowns occurs, which, for the sake of convenience, is attributed to a lack of experience on the part of the users if not to their lack of professional know-how. In this connexion it is well to remember that it sometimes costs more to buy things cheaply.

41. Some comfort may, however, be found in a reference here to the efforts made in recent years by African Governments and ECA to enable African countries individually or collectively to solve the knotty problems related to the choice of appropriate technologies and to conduct more adequate project study. The main results of these efforts have been:

- (i) The creation of the African Centre for Technology; 5/
- (ii) The project on the creation of an African regional centre for industrial consulting engineering and management; 6/

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5/ See the Report of the Meeting of Plenipotentiaries on the African Centre for the Development, Transfer and Adaptation of Technology (E/CN.14/ACTT/12/Rev.1).

6/ See "Progress report on the implementation of intercountry projects approved by the third Conference of African Ministers of Industry" (ECA/CMI/FCIA.4/WP.2).

(iii) The project on the creation of an African regional centre for industrial design and manufacturing; 6/

(iv) The project on the creation of an African industrial development fund. 6/

42. The establishment of the African Centre for technology, which is expected to take place in the near future, may properly be considered as a symbol and one of the results of the determination both of African countries and international bodies, which have decided to work together to bring Africa one step closer to domination over technology.

### III. POLICY AND STRATEGY COMPONENTS AT THE SUBREGIONAL OR REGIONAL LEVEL

43. The projects mentioned above, which are aimed at ensuring overall industrial self-reliance, prove that if action conducted at the national level is to be effective, it must be supplemented by other activities undertaken at the subregional or regional level. Policies and strategies related to the construction and building materials industries must be aimed at bringing about the following results on a relatively long-term basis:

- (i) Regional self-reliance in the production and marketing of raw materials and building materials, with emphasis on complementarity, account being taken of the overall resources picture;
- (ii) Integration at the regional level of construction and building materials industries with other subregional or regional industrial sectors;
- (iii) Effective and dynamic solidarity between the more highly privileged countries and the least developed and land-locked countries in the region.

44. At the national level, such results require the extension of subregional or regional co-operation to certain specific fields, to which consideration should be given in policies and strategies.

#### A. Co-operation in the field of production

45. While some materials may be produced and consumed locally, others call for sub-regional or regional co-operation in the light of factors such as the raw materials needed, the complexity of the technology required, the size of the factories in which they are produced, the capital required to produce them and the markets available for them. Such materials include manufactures and semi-manufactures, which are greatly needed in African countries, particularly for infrastructure and services, and which must be imported. Examples of such materials are cement, iron and steel, wood and window-glass. The need for wood is still a matter of grave concern in that Africa exports logs which come back later in the form of plywood, pannels of various sorts and other wood products. In recent years an encouraging effort has been made at the subregional level, and this effort should be promoted and imitated. For instance, the Ivory Coast, Ghana and Togo have co-operated in a project entitled "Ciments de l'Afrique de l'Ouest" (CIMA0), and Benin and the Niger have worked together on the "Ciments d'Onigbolo" Project.

46. However, much remains to be done. Self-reliance at the continental level requires, inter alia, that:

- (i) Those countries in Eastern and North Africa with good gypsum deposits supply cement works in the countries of Central and West Africa;

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6/ Ibid.

- (ii) In return, Central and West African countries develop their saw mills to the point where they can supply North Africa and other areas which are less richly endowed with forests.

47. Research into iron ore and asbestos deposits and the processing of those ores should be thought of as a priority. In these areas and in many others, policies and strategies should be accompanied by practical measures for dealing with priorities and programmes at the subregional level. Specific recommendations must be made to the competent international organizations, and especially to ECA and UNIDO, concerning the identification of multi-national projects and their implementation within a time limit which, wherever possible, is compatible with the availability of resources - natural and human resources as well as financial resources - in the region.

B. Co-operation in connexion with codes, regulations and other standardized specifications

48. One of the most severe impediments to the development of the construction and building materials industries is the almost total absence of codes and regulations applying to African countries. After over 15 years of independence, almost all the countries are still applying provisions laid down by the colonials, usually to meet the needs of their own countries. It is true that here and there certain changes have been made, but many of them are minor. When asked about the criteria governing some provisions, Government authorities responsible for applying these rules often find it difficult to give satisfactory answers. Moreover, the absence of standards and specifications often results in situations which, at the very least, occasion surprise. In a given African country the tests and specifications required in respect of one and the same material are those laid down in AFNOR, BS, DIN or ASTM, depending on whether the source of funds or the firm responsible for the job is French, British, German or American. It goes without saying that little heed is paid to local conditions in the country where the work is being done. Finally, the regulations applicable to urban planning categorically prescribe the use of some materials, especially traditional materials, in towns.

49. From the perspective both of production and of intra-African marketing, the development of the construction and building materials industries calls for the formulation and application of codes, regulations and other uniform texts covering the subregions whose boundaries are determined by the presence of similar physical and sociological conditions. The task of preparing such texts could be undertaken with the help, for example, of subregional standing committees.

C. Co-operation in the field of research

50. It should be borne in mind that it is mainly because of co-operation in research that industries in the developed countries have been able and will continue to make great strides in African research. The main stress should be on co-ordination and efficiency to be achieved through specific activities such as:

- (i) The convening of regular meetings of the directors of the national institutes (every two years, for example) so they can exchange views on research policy at the subregional or regional level. Such meetings would also promote exchanges of research programmes and research workers, the appointment of some institutes to conduct specialized work in specific fields, etc.

- (ii) The convening of regular meetings of research personnel working in the same field (every year, for example) so they can exchange and evaluate the findings of their experiments and gauge the progress made in their field. In addition to such meetings, special agreements should be made which will enable research workers to visit each other as often as possible;
- (iii) The establishment of an African regional centre for construction, housing and building materials.

51. In the absence of a central co-ordinating body, it may in practice be very difficult to secure the necessary co-operation among the various national institutes. At present the African countries are for the most part just as much in the dark concerning the research being conducted in other African countries, even though those countries may be they are immediate neighbours, as they are concerning the progress being made outside the continent. Some of the functions of a regional centre might be to:

- (1) Collect the necessary technical and socio-economic information, interpret it if necessary and convey it to the national institutes and agencies;
- (2) Organize meetings, symposia, seminars, workshops, etc.;
- (3) Work with international and other organizations in planning the training of specialists and technicians;
- (4) Keep up-to-date the statistical data relating to the various countries and needed for the development of national or multinational construction and building materials industries;
- (5) Organize the formulation and application, at the subregional or regional level, of the standards, codes, regulations and other uniform texts needed for the co-ordinated development of the construction and building materials industries;
- (6) Study and implement subregional or regional pilot projects if called upon to do so;
- (7) Maintain a list of African experts competent to perform specific tasks.

52. However, although there is a real need to establish such a centre, there is at present not enough information available on the various subregions to go any further at this time in defining the structure and functions of the centre. It can, however, be noted that to be realistic, recourse must be had to an existing centre whose infrastructure, range of activities and experience in Africa are relatively broad. This approach would certainly result in a considerable savings in both resources and time.



ANNEX I

DEFINITION OF SHORT-TERM PRIORITIES AND ACTION PROGRAMMES  
AT THE NATIONAL LEVEL

Topic	Field of activity	Action
Planning and programming	Building activities	Acquisition of technical instruments for long-term planning, especially in the public sector
	Raw materials and local energy resources	Identification of programmes relating to prospecting and inventory coordinated at the subregional level
	Import of raw materials, semi-manufactures and manufactures	Identification of programmes relating to quotas, substitution and diversification of sources of supply
	Local sources of financing	Inventory of existing and potential sources
Production of building materials	Existing industries, whether in operation or not	Programmes for the rationalization, renovation or conversion of industries to meet national or subregional needs
	Promotion of new industries	Programmes laying as much stress as possible on small- or medium-capacity units, with market surveys and studies of commercial and social viability. Identification and initiation of pilot projects.
Training and retraining	National contractors and workers	Systematic inventory and classification of the various categories of contractors and workers based on regional standards to be defined. Identification of programmes and of ways and means of training and retraining

Topic	Field of activity	Action
Familiarization	Familiarization with materials	Identification of the best approaches to the use of audio-visual and other facilities used in familiarization campaigns relating to materials
	Research findings	Application of conclusive results to particular projects (especially socio-collective buildings)
	Documentation - Information	Identification of the best ways of learning and using the findings of research conducted in the country, elsewhere in Africa and in other parts of the world
Research	Laboratories related to public works and building	Evaluation of present capacity and programming possible alteration of national institutes engaged in materials research
	Existing research institutes	Evaluation of capacity and needs
	Social and cultural aspects of building	Inventory of main criteria and requirements, with comprehensive analysis at the subregional level
	Codes, regulations and standards	Co-ordination at the subregional level
	Appropriate techniques	Collection of information on the various techniques now available, including traditional techniques
Development institutions and machinery	Techniques (planning, co-ordination, implementation, supervision, evaluation...)	Evaluation of existing institutions. Strengthening them or making innovations in them and defining the way in which they relate to each other.
	<ul style="list-style-type: none"> <li>• Training</li> <li>• Extension</li> <li>• Finances</li> <li>• Etc.</li> </ul>	

Topic	Field of activity	Action
Co-operation	Co-operation with countries in the subregion (bilateral or multilateral)	Identification of programmes stressing the pooling of various types of resources (raw materials, industrial and non-industrial projects)
	With developing countries in other regions	Collection of available information on appropriate technologies
	With developed countries	Special programmes intended to promote subregional or regional co-operation
	With international bodies	Greater knowledge of the role and fields of activity of various bodies  Programmes relating to assistance in planning, programming, development institutions and machinery, project identification, prefeasibility studies and project promotion.

ANNEX II

DEFINITION OF MEDIUM-TERM PRIORITIES AND ACTION PROGRAMMES  
AT THE NATIONAL LEVEL

Topic	Field of activity	Action
Planning and programming	Building activities	Long-term planning of the public and private sectors
		Long-term projection of demand in urban and rural areas and establishing programmes for the production of building materials
	Raw materials and local energy resources	Strengthening means for acquiring qualitative and quantitative knowledge Programmes aimed at effective, rational and planned use of these materials and resources, including their various by-products Special measures for the growth of renewable resources
	Import of raw materials, semi-manufactures and manufactures	Strengthening measures for the application of quotas with priority given to African sources of supply
	Exportation	Programmes for the development of raw materials and materials suitable for export to other countries, especially African countries
	Local sources of financing	Special measures to encourage and make the best of the internal capacity for financing with a view to the achievement of self-reliance, in particular at the level of small and medium-sized production units
Local production of materials	Co-ordination	Long-term production programmes taking account of other industrial sectors, especially those for which certain materials are essential raw material inputs

Topic	Field of activity	Action
Local production of materials (cont'd)	Self-reliance	Programmes for the production of various heavy and bulky materials in common use, with consideration given to local resources
	Units with small or medium capacity	Judicious distribution throughout the country with a view to extending the range of materials and the domestic market
	Promotion of new industries	Steady progress towards full integration, with consideration given to agricultural and industrial development at the national and subregional levels and to advances in research
Training and retraining	Architects and engineers	Programmes for and methods of continuous retraining
	Contractors and workers	Strengthening of measures designed to ensure steady progress towards the pre-eminence of nationals in the building industry (volume of work, turnover, etc.)
	Technical training institutions	Curricula stressing local materials and unconventional techniques
Familiarization	Knowledge of building materials and techniques	Intensification and broadening of familiarization campaigns
	Participation of the people	Programmes combining various techniques, especially in works of socio-collective significance
Research	Documentation-Information	Increasing the capacity for information exchange
	Research institutes	Installation of research units and implementation of research programmes slanted towards local resources with possible specialization in a subregional context

Topic	Field of activity	Action
<b>Research (cont'd)</b>	Codes, regulations and standards	Putting the results attained at the sub-regional level into practice
	Legal texts	Amendments allowing for, <u>inter alia</u> , the use of improved traditional materials
Development institutions and machinery	Techniques, training, extension, finances	Testing of structures on a regular basis Periodic evaluation of progress made Evaluation of linkages with other sectors and the taking of corrective measures if necessary
Co-operation	Co-operation with countries in the subregion or region	Implementation of agreements governing the active phase of industrial or non-industrial projects at the subregional or regional level
	With developing countries in other regions	Greater co-operation with these countries in the field of technology
	With developed countries	Implementation of specific programmes or projects
	With international bodies	Continued assistance in areas in their fields of competence.

ANNEX III

DEFINITION OF SHORT-TERM PRIORITIES AND ACTION PROGRAMMES  
AT THE SUBREGIONAL OR REGIONAL LEVEL

Topic	Field of activity	Action
Planning and programming	Construction activities and need for building materials	Acquisition of technical instruments for medium- and long-term planning
	Raw materials and energy resources	Subregional integration of national programmes with a view to determining the possibilities and defining priorities
	Import and export of raw materials, semi-manufactures and manufactures	Adoption of arrangements based on the complementarity of regional resources
	Sources of financing	Special measures for the least developed countries in the subregion or region
	Existing national industries, whether in operation or not	Arrangements for the mobilization of resources for subregional or regional projects
Production of materials	Promotion of new industries	Measures for the rationalization, renovation or conversion of some national industries producing materials, in such a way as to give them a multinational role
		Definition of programmes taking subregional priorities and potential into account and paying special attention to the most underprivileged countries
Training and retraining	Contractors and workers	Identification of industrial projects at the subregional level and carrying out of prefeasibility studies.
		Co-ordination of national programmes and pooling of resources wherever possible
Research	Documentation - Information	Inventory of progress made to date, especially in Africa but elsewhere as well

Topic	Field of activity	Action
Research (cont'd)	Existing national research institutes	Measures for the renovation or conversion of some research centres in such a way as to enable them to play a multinational role
	African Regional Centre for Construction, Housing and Building Materials	Action aimed at the creation of such a centre as soon as possible
	Codes, regulations and standards	Formation of subregional committees for determining the basic principles and defining ways and means of reflecting them
	Intergovernmental institutions	Evaluating existing institutions and machinery and making new arrangements if necessary
	Subregional or regional institutions created by international bodies like ECA	Measures favouring the intensive use of such institutions
Development institutions and machinery	Poorest countries	Formulation of special measures for integration.



DEFINITION OF MEDIUM-TERM PRIORITIES AND ACTION PROGRAMMES  
AT THE SUBREGIONAL OR REGIONAL LEVEL

Topic	Field of activity	Action
Planning and programming	Construction activities and need for building materials	Co-ordination over the long term at the subregional level with periodic review by a subregional standing committee of national experts
	Raw materials and energy resources	Definition and application of sub-regional standards for the rational exploitation of resources, including waste materials
	Importation and exportation of raw materials, semi-manufactures and manufactures	General measures for regional self-reliance, focusing on complementarity in the light of the whole resource picture. Development of intra-African trade along with basic infrastructures
	Sources of finance	Increasing the internal capacity for financing industrial and non-industrial projects
	Co-ordination and integration	Long-term subregional or regional programmes, taking into account other industrial sectors for which building materials are vital primary goods
Production of materials	Promotion of new industries	Continuation of work on identification of subregional projects in the light of agricultural and industrial development. Prefeasibility and feasibility studies and launching of projects identified
Training and retraining	Contractors and workers	Use of common structures and facilities for periodic retraining in particular techniques

Topic	Field of activity	Action
Training and retraining	African expertise	Special measures to develop and gradually to increase Africa's capacity in a number of fields (planning, research, organization, management, technology, etc.)
Research	Documentation - Information	Setting up practical systems for the diffusion of information on work performed in Africa and other regions
	National research institutes	Co-ordination of policies and efforts together with exchanges of research workers
	African Regional Centre for Construction, Housing and Building Materials	Increasing the capacity of the various departments and possibly the creation of subregional branches
	Codes, regulations and standards	Formation of subregional standing committees to formulate and revise statutory texts, bring them up to date and determine the ways and means of applying them.