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Meeting of African Experts
on the Building Materials
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PROGRESS REPORT ON THE PROGRAMME FOR THE DEVELOPMENT OF THE BUILDING
MATERIALS AND CONSTRUCTION INDUSTRIES

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I. PRELIMINARY CONSIDERATIONS

1. The basic objective of the programme for the development of the building materials and construction industries is two-fold: the implementation of practical development projects which are of top priority for African countries and the improvement of the decision-making process and the administrative apparatus of African Governments. It is designed to meet the immediate and urgent needs of the States members of the Commission while at the time preparing them to meet future demands effectively.

2. The programme must enable the African region as a whole to realize its aspirations and to obtain its development goals, including independence in the production and marketing of essential goods by inventorying and exploiting natural resources and mobilizing financial and human resources and using them rationally; intra-African co-operation brought about through as much pooling as possible of those resources, through subregional and regional activities and through specific projects relating to building materials and construction and the establishment of some kind of balance between the least advanced and the most highly developed countries in the region by providing African countries which are land-locked or not very highly developed with special assistance and economic support.

3. This programme is expected to make it possible to achieve direct and concrete results which will be particularly beneficial for African countries and for the region as a whole. Such benefits include the reduction of the very substantial expenses now incurred by purchasing imported building material; increased possibilities of employment in new or expanding industrial activity and an improvement in the over-all social structure and social welfare system because less is paid for housing, community facilities and the human settlement infrastructure since the price of building materials and construction costs are lower and resources are used more efficiently.

4. However, if these results are to be achieved within a reasonable period of time, it must be borne in mind that this programme has been designed for African countries and must be implemented by all of them. African Governments must recognize that its implementation calls for the investment of a substantial proportion of the national resources available; the reorganization of the administrative structure and the transformation, enlargement and improvement of national institutions through a determined effort to break the vicious circle in which the building materials and construction sector has so far been caught with the result that every year the burden borne by the economy of African States grows heavier. United Nations agencies and other bodies will provide what assistance they can, but their resources which are relatively limited when viewed in the light of the large expenditure which will be required, can serve only to bolster the efforts made by the African countries themselves.

II. OUTLINE OF THE PROGRAMME

A. Background, origin and nature of the Programme

5. The Programme is the result of a series of activities undertaken by the United Nations Economic Commission for Africa (ECA); the Organization of African Unity (OAU); the United Nations Development Programme (UNDP); the former Centre for Housing, Building and Planning, which has since become the United Nations

Human Settlement (HABITAT) Centre, and the United Nations Environment Programme (UNEP) for the purpose of developing the capacity of African countries where matters related to human settlements are concerned.

6. In particular, the following resolutions, projects, studies and declarations of principle produced by ECA and a number of other bodies relate directly to the original idea behind the programme and to its objectives.

(a) Commission resolution 309/17 of 14 February 1969;

(b) Project 9.293 for promoting the rational use of resources for housing and the rural infrastructure within the framework of integrated rural development and project 9.294 on the development of the building industry;

(c) The ECA publication intitled "Human settlements in Africa: The role of housing and building" (E/CN.14/HUS/15;

(d) Declaration of principles and recommendations for measures at the national level with a view to developing the building materials and construction industries, as adopted by HABITAT: United Nations Conference on Human Settlements held in Vancouver in 1976;

(e) Decisions taken by the Governing Board of UNEP;

(f) Conclusions reached at the third meeting of the Follow-up Committee on Industrialization in Africa.

7. At its fourth meeting, held in Kinshasa in February/March 1977, the ECA Conference of Ministers endorsed previous recommendations, resolutions and decisions concerning the building industry and provided related activities with the incentive they reached by explicitly conferring priority on the development of the building materials industry in Africa. Pursuant to that decision, the Housing, Construction and Physical Planning Section of the joint ECA/UNIDO Industry Division established the programme for the development of the building materials and construction industries, which went into implementation in August 1977.

8. Later on, in view of the fact that the programme had made encouraging progress from its inception, it was sanctioned by another two resolutions, as follows:

(a) Resolution 8 (IV) of the Conference of African Ministers of Industry held in November 1977; 1/

(b) Resolution 4 (I) adopted by the Intergovernmental Regional Committee on Human Settlements at its meeting in October 1978. 2/

B. Objectives of the Programme

9. The main objective of the Programme for the Development of the Building Materials and Construction Industries is to encourage and help African countries to increase their propensity for independent growth and to make the building materials and construction industries self-supporting at the continental level as soon as possible.

10. The Programme emphasizes the development of the production of building materials. However, because the production of building materials relates directly to certain industries engaged in other activities, the programme is also aimed at developing the building industry, in its role as a user of building materials and such other industrial activities as the agro-industries, the metallurgy industry and the chemicals industry, which produce the raw materials and semi-manufactures required to produce building materials.

11. If the Programme is a success, it will also encourage the creation of complementary local industries, which would have a very useful role to play in, for example, producing simple tools and the equipment and light machinery needed in the implementation of building programmes and the spare parts and accessories required by the building materials industries themselves.

12. Finally, the Programme is aimed at the development of a number of subsectors, such as research, training and information, which may be thought of as underpinning the Programme and as being essential to its success.

13. The Programme has the following specific objectives:

Immediate objectives

- (i) To study the present position of the building materials and construction sector;
- (ii) To identify and analyse national requirements, paying special attention to problems which often confront the least-developed and land-locked countries in the region;
- (iii) To formulate or strengthen policies and strategies and to determine national, subregional and regional priorities and programmes;
- (iv) To improve the institutional apparatus, especially where financial institutions are concerned.

Long-term objectives

- (i) To promote the process whereby complementarity is established in co-operation and development;
- (ii) To encourage technical co-operation between Africa and the other developing regions in accordance with one of the global economic targets set by the United Nations;
- (iii) To step up the production of housing and buildings and to improve slum areas and other districts occupied by squatters with a view to increasing the quality of life and reducing building costs thus furthering the expansion, improvement and maintenance of human settlements;
- (iv) To develop local skills at all levels and to foster a spirit of enterprise in Africa;

- (v) To strengthen people's ability to do research work, and conduct studies with a view to the production, transfer and adaptation of the technology most suitable in Africa;
- (vi) To integrate the construction industry by developing its weakest component, i.e., by ensuring the availability of building materials which in terms of price, quantity and quality, are suitable for local use;
- (vii) To enhance the efficiency of existing building materials plants and their ability to work to capacity, and to create new industries on the basis of innovative research and studies and the efficient use of resources, including energy derived from new sources;
- (viii) To implement integrated rural development programmes by setting up medium- and low-capacity building materials industries in rural areas in close association with new or existing rural settlements thereby increasing the number of jobs available to the population and helping to control rural migration;
- (ix) To adopt policies and programmes furthering self-reliance and based on the participation of the people in the greater and more rational use of traditional techniques and building materials by having recourse to co-operatives and self-help housing schemes and by building dwellings in housing developments;
- (x) Where feasible, to implement multinational industrial projects to meet the present shortage of some materials, to offset or eliminate the imbalance in the production of other materials and, in general, to further the process of bringing about intra-African complementarity, co-operation and development.

14. To attain the objectives outlined above, action should be directed to the following areas of activities simultaneously:

- (i) The development of raw materials which might be used in producing building materials;
- (ii) The manufacture and processing of building materials;
- (iii) Research, advisory services and technical and technological promotion (including manpower promotion);
- (iv) Promotion of building services and infrastructure.

C. Schedule of operations

15. The Programme for the Development of the Building Materials and Construction Industries was designed for implementation - at least up to the end of 1981 - in two phases roughly corresponding to the immediate and long-term objectives described above.

(a) Phase I: Preparatory phase: August 1977 - September 1979

16. In this phase special emphasis will be placed first on a rational inventory of resources of all kinds, including those available in the form of research findings which might be useful to the African region, and second on the establishment of those national, subregional and regional institutions which are vital in the implementation of practical projects identified on the basis of an analysis of the needs of African countries with special attention paid to production and procurement in the last advanced and land-locked countries. Another aim to be pursued in this phase is the development or strengthening of national, subregional and regional policies and strategies and the identification of priority areas; programmes and technical, financial and other facilities which might help the programme to be carried out dynamically and pragmatically. The following activities will be conducted at the end of this phase:

- (i) A meeting of experts to consider and assess the work performed;
- (ii) The preparation of the detailed programme for phase II.

(b) Phase II: October 1979-- December 1981

17. The details of the work carried out in this phase will depend a great deal on the work accomplished during the first phase. However, it will in all likelihood consist of:

- (i) The continuation of sectoral studies at the country level;
- (ii) The implementation of national programmes by way of the pilot projects identified in phase I;
- (iii) The implementation of pre-feasibility and feasibility studies and of subregional or regional pilot projects;

The end of this phase will be marked by:

- (i) A review and evaluation of the work performed in both phases of the programme;
- (ii) The taking of decisions concerning the prolongation of the programme and steps to be taken in future.

D. Sources of financing

18. It was envisaged that the financial resources allocated for this programme and its implementation would come from a number of resources, including, in particular:

- (i) The ECA budget in the case of activities in which staff of the Commission participated;

- (ii) From UNIDO in payment of experts seconded to the joint ECA/UNIDO Industry Division;
- (iii) From UNDP in payment of experts seconded under the regional programme of UNDP;
- (iv) The United Nations Fund for HABITAT and Human Settlements in payment of experts recruited under the Joint ECA/UNEP programme relating to human settlements techniques;
- (v) Out of contributions from States members of ECA, such contributions to be used to pay national counterpart experts assigned to ECA at its requests and, as needed, to finance staff and installations in countries in which the programme is implemented;
- (vi) Bilateral resources for the implementation of specific pilot projects.

E. Staff

19. African experts seconded from national organizations engaged in activities relating to the building materials and construction industries should be closely associated with the programme in a counterpart capacity. Staff recruited and paid through UNDP will, in so far as possible, include nationals from other developing countries so that concrete and useful experience acquired in other developing regions can be transmitted to Africa. In that way, a contribution will be made to the actual application of the principle of technical co-operation among developing countries.

III. SUMMARY OF ACTIVITIES (1977-1979)

A. First mission of experts to the field (August-September 1977)

20. Following a series of preliminary activities (preparation and finalization of the project document, discussions with organizations sponsoring the project, recruitments of consultants, etc.), the programme finally got off the ground in August 1977, when a team of experts was sent to eight African countries - Benin, Burundi, Gabon, Ghana, Lesotho, the Niger, the Sudan and Togo. The work assigned to this team of experts may be summarized as follows:

21. To assess the position of the building materials industry in the light of the present and future needs of African countries and of the raw materials available locally and to study units now producing building materials; R and D activities underway and the institutions engaged in them, traditional building techniques, building materials and approaches to building and laws and regulations relating to building to see whether they promoted or impeded the development of building materials industries. The team was also called upon to prepare an inventory of existing studies and reports in this field, of ongoing or proposed projects or programmes relating to human settlements techniques and of training and professional institutions concerned with training manpower employed in the building and construction industries, thereby providing a framework in which existing institutions

could be used as a base for a well integrated building materials industries able to meet local needs and, when appropriate, to identify the possibilities for industrial development with a view to meeting intra-African needs.

22. In the light of the foregoing, in order to formulate national, and in some cases even regional, objectives and a consistent strategy of self-reliance and a method of developing and increasing the capacity of the building materials industry in Africa in general and in individual African countries in particular while at the same time outlining specific solutions to the problems identified in various sectors in such a way as to define the characteristics and structure of the building materials industries envisaged with particular attention paid to the need to provide a detailed definition of their role and functions, their linkages, structure, location, environmental impact and means of financing, the mission should identify priority fields of action within the framework of pilot projects and draw up a relevant programme of action for each African country and possibility also for groups of countries.

B. Report of the first mission of experts (November 1977)

23. The extremely valuable information collected by this team of experts was put into a report 1/ along with a list of about 20 pilot projects identified and relevant recommendations for submission to the Follow-up Committee on Industrialization in Africa at its fourth meeting and subsequently to the Conference of African Ministers of Industry at its fourth session, both of which were held at Kaduna, Nigeria, in November 1977. By elevating the construction industry and building materials industry development programme to second place in the order of priorities, immediately after agro- and food industries, the African Ministers wished not only to show their satisfaction with the work accomplished while at the same time encouraging international and intergovernmental organizations which had helped to put the programme into operation to work together even more closely in this field, but also and above all to give African States greater responsibilities in the development of the building materials and construction sector. 2/

C. Meeting of African Experts on Building Materials (July 1978)

24. In view of the Ministers' concern to bring member States into as close association as possible with the implementation of the programme, the ECA secretariat asked a number of Governments to send national experts from their country to a meeting held at Addis Ababa from 17 to 21 July 1978. This meeting had a three-fold objective:

- (i) To review the present position of the building materials and construction industries; to identify the various components of the strategy for the promotion of these industries and, having determined the components, to recommend a policy and along-term development programme setting forth the national, subregional and regional objectives and specifying ways of achieving them;

1/ See document ECA/CMI/FCIA.4/WP/5; ECA/CMI.4/INR/WP/5.

2/ See Resolution 8 (IV) of the Conference of African Ministers of Industry (contained in Annex I to this document).

- (ii) To recommend ways of planning the activities of the building materials and construction sector in such a way that they would be integrated in national plans and co-ordinated with the development programmes of other economic sectors;
- (iii) To identify priority areas for the formulation of national, subregional and regional projects in the building materials and construction sector.

25. Of the 13 countries invited, only Burundi, the Congo, Gabon, the Niger, the Sudan, Togo, the United Republic of Tanzania and Zaire were able to send representatives. The meeting was also attended by observers from Ethiopia and from the following organizations: ADB, ILO, OAU, UNEP, UNHHSF, UNIDO and UNDP.

26. The report of this meeting of experts, including the recommendations made at it, are contained in a document 1/ which was sent to all member States along with other working papers 2/ at the request of the participants. It is hoped that in formulating national policies and strategies for the development of this sector, African Governments will in future refer to the recommendations made at this meeting of experts.

27. Those recommendations were submitted to the Intergovernmental Regional Committee on Human Settlements at its first session, held at Addis Ababa from 2 to 6 October 1978. The Committee expressed its full satisfaction with the work done so far under the building materials and construction industries development programme. 3/

D. Additional measures taken by ECA pursuant to various resolutions and recommendations

28. The first series of studies undertaken by ECA and evaluated at the meetings mentioned above showed which areas needed attention and action if the following activities were to be promoted within a global framework:

- (i) Rationalization and management of production factors, with special importance attached to local resources, to techniques and to systems of production and supply;
- (ii) Increase and modernization of the production of building materials and the setting of standards of quality for products (to meet real needs) and of distribution infrastructures;
- (iii) Promotion of building systems and services based on local resources and needs and their speedy take-over by local personnel; special attention to be given to the training of a corps of local contractors made up entirely of nationals;

1/ E/CN.14/HUS/24.

2/ See documents E/CN.14/HUS/22 and 23.

3/ See resolution 4 (I) of the Intergovernmental Regional Committee on Human Settlements.

- (iv) Adequate and effective harmonization between the planning and the operational sectors at the national level (and also, wherever possible at the inter-national level within the African region) for the purpose of developing the building materials industries in such a way that they are synchronized with other sectors, the final goal being self-reliance in building materials and services by the year 2000;
- (v) Establishment of an effective and modern basic service dealing with information, research and technology, training and local manpower promotion and the financing of building activities for the purpose of supporting the action referred to above.

(a) Financial assistance from UNDP and other organizations

29. Because of the importance and priority given to the programme by African leaders, the ECA secretariat had to put the first activities on the programme into operation, putting the necessary expenses on its own budget or charging them to the United Nations Trust Fund for African Development (August 1977-September 1978). These activities included, in particular, the first mission of experts to the field and the organization of the meeting of African experts mentioned above.

30. The first studies made indicated that the magnitude of the tasks to be carried out was such as to make it necessary to seek additional sources of financing. The ECA secretariat thus decided to allocate 800,000 US dollars out of the total 10,000,000 US dollars allocated by UNDP to cover the ECA inter-country programme for the period 1976-1981 to the building materials and construction industries development programme. Of this \$US 800,000, \$US193,000 is intended to finance some of the activities in the preparatory assistance phase of the project (October 1978-September 1979) and the rest to finance the final phase (October 1979-December 1981). With that in mind, the ECA secretariat submitted a preparatory assistance document covering the first phase (October 1978-September 1979) to UNDP, which approved it up to the end of the first half of 1978. The same document was sent to all countries members of the Commission in an attempt to attract their suggestions and views concerning the programme.

31. In view of the favourable and encouraging response which the ECA secretariat had from a number of African countries and because of the allocation granted by UNDP, a special group of experts was set up within the Housing, Construction and Physical Planning Section of the Joint ECA/UNIDO Industry Division for the purpose of helping African countries, at their request, to carry out the relevant tasks and to create and maintain the services mentioned above.

32. At the same time the ECA secretariat began to explore other possibilities for financial assistance (including bilateral aid) for the implementation of pilot projects which had already been formulated or remained to be identified within the overall framework of the programme. However, the scope of such possibilities will depend to a great extent on the needs which African countries express individually or, better still, in groups in the light of the objectives of the building materials and construction industries development programme.

(b) First studies by the Group of Experts

33. Since it was impossible to go to all the African countries to make an on-the-spot study of conditions in the building materials and construction sector, analyse the individual needs of the States and make pertinent recommendations based on the findings, as a first approach to the identification of the specific action deemed necessary and to lay the ground for the establishment of an order of priorities, the Group of Experts undertook a number of studies and drew up a comprehensive questionnaire which focuses on the fields of action within the overall framework mentioned above, i.e.:

- (i) Development of raw materials which might favour the production of building materials;
- (ii) Manufacture and processing of building materials;
- (iii) Research, advisory services and services for technical and technological promotion (including systems of manpower promotion);
- (iv) Promotion of construction services and infrastructures.

34. The questionnaire was designed to allow African Governments to assess their existing potential and services, to choose the kinds of promotion of use to them and to indicate, where necessary, the kind and amount of assistance required in the formulation and implementation of their projects. This questionnaire is now under consideration by the Governments of member States, some of which have already sent their replies to the secretariat of the Commission.

35. Among the other studies now under way, special mention should be made of the compilation of documents relating to research into materials and technology which have stood the test, especially in other developing regions, and might be useful to African countries. The object of this exercise is to inform Africans in decision-making positions, planners and other authorities of the various solutions which might be adopted and of the possibilities of producing given types of building materials so that their decisions might adequately reflect the actual situation in their respective countries.

Because of the repercussions which this work will have in African countries, other documents directed more especially at technicians, agencies and the general population, particularly in rural areas, will be prepared and distributed as widely as possible.

(c) Other missions of experts in the field

36. In view of the encouraging reaction of some countries to the various documents relating to the programme which had been sent to all the member States, the need was felt to carry out a second missions of experts from December 1978 to January 1979. This mission went to Burundi, Kenya, Togo and the United Republic of Tanzania. In addition to the fact that these countries had expressed a desire to receive an ECA mission, they have some of the problems which are peculiar to least advanced and land-locked countries and countries which, while not falling into either of these categories, have special problems; are living through unusual experiences; are implementing building materials and construction programmes and have basic services

which might be capable of devising a strategy for and a global approach to the development of the building materials and construction sector in the whole African region, at least during the initial phase of the programme. Time did not permit the inclusion of other countries in the itinerary of this mission.

37. For that reason, a third mission was organized as soon as possible and visited the following countries between May and July 1979: Egypt, the Gambia, Guinea-Bissau, Mali, Nigeria and Senegal. There are plans to conduct other missions to all the subregions during the implementation of the project as such (October 1979-December 1981). However the Group of Experts has already reached some conclusions, the most telling of which are summarized in Chapter IV below.

(d) Relations with other organizations

38. As mentioned above under objectives, the building materials and construction industries development programme covers not only the exploitation of local resources for the production of materials but also their use for the benefit of the majority of the population and the installation of the basic services required for the rational and harmonious development of the sector in question. Thus a substantial effort has been made insofar as is possible to associate other organizations (in particular those in the United Nations system) in the work of the programme. Of these organizations, special mention should be made of the United Nations Industrial Development Organization (UNIDO), the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP), the United Nations Centre for Human Settlements (Habitat) and the United Nations Educational, Scientific and Cultural Organization (UNESCO). Liaison with all of these organizations has already yielded or is expected to yield promising results. Such liaison will be extended to other organizations like the International Labour Office and the Food and Agriculture Organization of the United Nations (FAO) and to regional (such as OAU) and subregional (CEAO, ECOWAS, CEPGL, PCCM, UDEAC, etc.) groupings, which will be given a special role. It is also expected that contact with international bodies and with donor agencies and countries will make it possible during the implementation of the project as such to enter into co-operation agreements and to carry out practical projects.

IV. SOME THINGS TO THINK ABOUT

39. The observations made during the various missions have already given rise to reports or documents ^{1/} which were considered during the meetings mentioned above. The purpose of this chapter is to summarize some of the factors involved so as to enable consideration of the scope and urgency of future tasks.

(a) Use of raw materials

40. Broadly speaking, it is possible to talk about two basic kinds of building systems - urban and semi-urban structures and other structures, i.e., non-urban and rural structures. Since the habitat and the environment in rural areas and in urban areas have their own special characteristics, different building materials are naturally used, and those building materials are derived from different raw materials

^{1/} See in particular documents ECA/GMI/FCIA.4/WP/5; ECA/GMI.4/INR/WP/5 and ECA/CN.14/HUS/21, 22, 23 and 29.

41. In non-urban and rural building, the materials used, in addition to earth and adobe, mainly consist in the direct or indirect by-products of agricultural production. It does not require a high degree of mechanization or the adoption of special techniques within the context of the traditional practices in use to extract, gather or process these products. If anything is needed in this connexion, it is research, the recovery of improved materials and of materials derived from recycled waste and conservation, all of which would be of direct help in reducing the cost of materials and hence construction costs, would ensure that materials and supply facilities were more readily available and would make an effective contribution to the success of environmental protection programmes.

42. This dependence on agricultural production for building in rural areas will continue indefinitely because of the way the people of Africa live. Agricultural products are used in building not only because they are cheap but also because they are readily available and easy to obtain. This tradition will be upheld even if innovations are made. It is therefore of the utmost importance that the rural population is not left to cope for itself as it has been hitherto and that a programme intentionally based on an effort to encourage the use of these materials is set up under a government strategy to ensure that they are available wherever necessary. For example, while on mission the team noted that papyrus was found in abundance and that bananas were extensively cultivated but that seemingly no real efforts were being made to process and use the fibres of these plants in connexion with low-cost rural housing programmes. This is probably mainly because these plants grow in scattered areas, where no system has been set up for collecting and distributing them. Thus two materials useful in rural construction are not employed for reasons which have nothing to do with cost or acceptability or even with performance. The team recommends that ECA and UNIDO be requested to undertake a prefeasibility study with a view to assessing the present and future availability of these materials determining practical ways and means of distributing them and shipping them to given destinations and setting up pilot projects for processing them. These are all things which might help to stimulate local interest in the promotion and use of these materials within a self-help context. It would seem that the use of these materials is doubly promising in that it would benefit the land-locked countries and solve some of the practical problems posed by the exclusive use of corrugated sheet-metal for roofing.

43. On the other hand, urban and semi-urban building is concerned with structures of some degree of permanence and is usually not bound by stereotyped blueprints which have been laid down once and for all or by an architectural model; there are constant innovations in the blueprints and the construction. Here again, even taking the whole range of modern blueprints into account, the use of materials derived from minerals, such as bricks, cement, glass, tiles and sheet metal, is unavoidable now and will remain so. This means that the raw materials from which these materials are manufactured, including limestone, marble, gypsum, clay, kaolin, sand and quartz, will always be quarried and exploited. One of the most widely used organic elements in construction is wood.

44. Parallel with the implementation of a programme for conserving materials, using waste products and giving priority to raw materials available locally for processing purposes, a special effort must be made to raise the quality of and realize the full potential of inferior categories of raw materials with a view to making them technically acceptable and suitable for transformation into building materials.

This programme should be effectively harmonized and co-ordinated with programmes in two other important fields of action, i.e., (a) Materials research and standardization and (b) the realignment of building codes, regulations and specifications.

45. The promotion of the materials mentioned, including wood, requires a series of activities beginning with prospection and other kinds of geological studies carried out with a view first to identifying reserves and determining their quality, second to exploiting the resources identified and third to setting standards of quality and taking similar measures. All these activities must be adequately supported by infrastructural services (transport, power, water, etc.). In a number of countries this series of activities is only in its infancy and in others it is still in the realm of desire, and therefore some assistance and attention is required from ECA.

(b) Development of the production of building materials

46. The team noted that the rate of growth in the demand for building materials was increasing very fast owing to economic factors related to urbanization. The figure for Burundi, for example, is 7.7 per cent a year.^{1/} As for Kenya and Togo, where rural migration is heavier than in Burundi, the rate of growth in the demand for building materials is bound to be higher and is probably around 10 per cent. Because of the launching of programmes for the creation of new urban centres (such as Dodoma) and the regionalization of economic and social activities in the United Republic of Tanzania, it is possible that the rate of growth in the production of building materials is still higher there.

47. Generally speaking, therefore, the production of building materials is not being held back by a low demand, except where plants were designed to produce on a "ready-to-wear" basis in keeping with the concepts held by and the economic model of the Western countries, in which case capacity may exceed demand. The real problems arise out of insufficient use of production capacity, which is very evident in the case of cement and bricks; and inadequate supply or total lack of raw materials and the shortage of qualified technical manpower.

48. On the basis of the development plans of any African country and the very predominant role which is always assigned to large government projects in connexion with infrastructure such as dams, roads, ports, airports, bridges, educational and health centres and commercial and industrial complexes, it must be admitted that the growth and development of urban centres are ongoing processes. Urban centres will continue to swell, creating constant pressure in the form of demand for building materials in towns. Of all the building materials required in urban areas, cement is the most in demand. The team is firmly of the view that no African country can claim to produce more cement than it needs since the demand for cement will invariably rise to the level of production. This is the situation in a number of developing countries in Asia, especially India, which although domestic production rose from 8 to 18 million tonnes during the past 10 years, must depend on imports and has even been compelled to step demand down by regulating supplies. If the basic raw materials are available, it would be wise to plan to create units for the production of cement and to give the highest priority to such a policy. The team is also of the view that the question of the availability of limestone must take precedence over all other issues (such as that of the domestic market) with consideration given to the ability of Africa, and particularly of its individual subregions, to be self-sufficient.

^{1/} The team was supplied with this figure during its discussions at the Ministry at Bujumbura.

It is very interesting to note that Togo, Ghana and the Ivory Coast are working together to create a large unit for the production of clinker at Tabligbo, Togo. This unit will have an initial capacity of 1,200,000 tonnes and will service the crushing plants now present in or planned for the three countries. The Group of Experts feels that the possibility of implementing similar projects should be seriously contemplated for other groups of countries and recommends that ECA be requested to carry out a study to determine the physical factors involved.

49. As the team had occasion to explain in the course of its discussions with the authorities in the various countries it visited, there is also a need to help countries to conserve their scant vital resources by discouraging the consumption of cement where its use is not essential and other materials may effectively perform the same function since the supply of cement will never be equal to the demand even if production rises. In this connexion it should be noted that even though they produce about 780,000 and 2,500,000 tonnes, respectively, the Central African subregion and the eastern African subregion must plan for net imports of about 400,000 tonnes of cement.^{1/} Nor is the situation better elsewhere, for statistics show that even if all the cement factories now operating, under construction or in the planning stage in Western Africa (not including Angola and Zaire) were producing to full capacity in 1980, this subregion would still have to import over 2 million tonnes of clinker and bagged cement. Actually it is estimated that there will be a demand for 11,780,000 tonnes of cement in 1980 whereas the factories will be producing a total of 9,495,000 tonnes. ^{2/}

50. The ECA team is convinced that in the case of lime and pozzolana research must be undertaken in African countries where these materials might be used in both urban and rural areas. Fortunately, research centres such as the one at Cacavelli, Togo, have acquired the technical equipment needed to conduct basic research in this connexion and have offered to provide technical assistance to other countries at their request.

51. In many African countries there is now too great a tendency to consider the use of bricks composed of a mixture of sand and cement to be a panacea, even in the construction of low-cost dwellings, and Governments aware of the irrationality of this policy are trying to encourage the use of clay bricks (baked or not); however, they are hampered in this attempt by a shortage of this kind of brick. Moreover, clay bricks are not easy to transport. In this connexion, it should be noted that the Cacavelli (Togo) centre has pioneered in the use of unbaked clay bricks (stabilized earth bricks). This work attracted the attention of the European Development Fund, which decided to use stabilized earth bricks to build some 100 dwellings for workers at CIMAO at Tabligbo, Togo, the project being implemented jointly by Togo, Ghana and the Ivory Coast. Here is an area where ECA could take the initiative and offer technical assistance aimed at the use of stabilized earth wherever adequate supplies of the raw material are available.

52. As for baked bricks, wherever adequate fuel is available, countries could be assisted in the design of simple and improved kilns (Bull type) to meet their rural needs and of mechanized units to meet the heavy demands of urban areas in such a way as to promote the production and use of this material.

^{1/} See E/CN.14/HUS/21, annex I, table 2.

^{2/} See document E/CN.14/HUS/22.

53. In the countries visited there are at present very few units producing tiles (for bathroom appliances and roofing, for example) or glass. Some countries are planning projects for such production. Inasmuch as there are real possibilities for action by several countries in this connexion, the ECA team should wait to receive replies to the questionnaire indicating whether the national demand is sufficient to make it worthwhile formulating concrete projects. The possibility of producing roofing tiles in low-capacity units was discussed by the team during its mission. Since such a project might be of interest to a number of countries with kaolin, quartz and feldspar deposits, it is recommended that ECA follow up on the matter.

(c) Development of research and services

54. It was extremely gratifying to note that all the chiefs of service and other authorities encountered by the team favoured and commended the importance and priority accorded by ECA to the creation and renewal of materials research and testing centres and the establishment of an integrated information network and a data bank on building materials and the raw materials from which they are derived as an effective support to the harmonious development of the building sector.

55. Taking the fact that most countries use the same building materials, in both the urban and the rural context, as fundamental, the ECA team strongly recommends a common approach as a point of departure, an approach based on the sharing of mutual advantages by groups of countries or even within a subregion if that turns out to be possible with a view to finalizing and putting into operation an African programme concerned with research, advisory systems and promotional services. This programme, which will be implemented on a multinational basis, will by no means stifle national initiative. The basic merit of such an approach is that it gives rapid access to the type of information needed, to existing services and to findings which have already proved valuable, thereby making it possible to save time and effort and to take advantage of the body of experience gained in fields already explored. It is also suggested that these centres should be operationally related to similar bodies in other developing regions, with which they could organize meetings or perform work in common, carry out exchanges of research workers and hold training courses. The following are some of the subjects which might be studied:

- (1) Techniques of upgrading and handling waste material;
- (2) The identification of possibilities of reducing the cost of producing such materials as cement, bricks, lime, glass and wood;
- (3) Economy in building from the point of view of reducing costs related to building methods and techniques;
- (4) The preparation of suitable designs for kilns and even the manufacture of tools which could easily be purchased, used and maintained by local manpower;
- (5) Joint studies and tests on raw materials resources preparatory to embarking on geological and mineral studies of a more far-reaching nature;

(6) The study of low-capacity production units apt to promote the regionalization of production activities at the national level with a view to:

- (i) Relieving bottlenecks in supply and distribution;
- (ii) Reducing transport costs (which, in the case of cement, are as high as the cost of the product itself);
- (iii) Promoting the participation of all strata of the local population in the attainment of the goal of national self-reliance;
- (iv) Creating a body of specialists and systems and services which would function all across the continent with a view to securing the necessary mutual assistance and co-operation;
- (v) Helping to rationalize codes and regulations in conformity with national needs;
- (vi) Creating an effective and permanent link between research and technology and between research and building services.

56. These ideas and many others have already been expressed in one way or another in a number of documents. ^{1/} The various kinds of action recommended will be almost impossible to take unless African countries actually adopt the ECA regional programme for the development of the building materials and construction industries. As mentioned above, this programme has been designed in such a way that it requires real participation on the part of all States members of the Commission. They are called upon to evaluate their needs and specify areas where assistance is required. They must also agree to undertake, with the help of international organizations, if necessary, various kinds of institutional and administrative restructuring and the establishment at the national and regional levels of the machinery needed to fulfil their desire to become collectively self-sufficient with regard to the building materials and construction industries within a reasonable time. The attainment of this final objective depends first and foremost not only on the transformation of public structures but also on the launching of a first series of activities at the national level only. Such measures include:

- (i) The incorporation of a team of experts in the national planning office, to enable it effectively to tackle problems relating to the sector under consideration within the framework of the national economic, social and cultural development plan;
- (ii) The creation of research institutes specializing in building materials, construction, housing and the development of human settlements or the strengthening of the output of existing institutes, which must be allocated more substantial funds and provided with adequate human resources;
- (iii) The launching of a systematic survey covering the entire country to determine what natural resources, especially energy resources, and financial resources might be needed to develop the sector in question;
- (iv) Active participation in negotiations with neighbouring countries with a view to the establishment of effective subregional co-operation in the building materials and construction sector.

^{1/} See Annex III.

57. The various countries concerned are expected to act on their own initiative in doing everything in their power to take decisions and make other provisions at the national level and to take specific measures as necessary. It is of course obvious that it will be difficult to obtain funds in the amount called for to implement the entire programme. ECA and the co-operating agencies and other bodies will help countries to find donors and sources of loans for the various projects. However, United Nations technical co-operation funds are allocated on the basis of emergency orders issued by Governments. It is therefore clearly up to the Governments to take the necessary decisions. In these conditions, a decision in support of a large-scale project in this particular sector will be compatible with the priority given by the Government to the development of the building materials and construction industries.

58. Governments are expected to be generous in making the services of highly qualified experts from their countries available to other countries and to ECA and other institutions when their technical expertise is needed to carry out important activities under the programme. The experience they might acquire by undertaking such responsibilities will certainly be useful to them in exercising their customary duties when they return to their countries. Finally, to exchange personnel in this way may turn out to be one of the most positive ways of achieving understanding and co-operation among countries.

59. Countries would not be able to develop in isolation and must participate fully in the limited community of neighbouring nations and in the wider community of the region and the world. This programme calls on all African countries to open up so they may grow and develop together on a give-and-take basis. A number of the activities provided for under this programme, especially those at the subregional level, can be launched and executed only on the initiative of the Governments concerned. These activities must be based on agreements between nations, and ECA and the other institutions involved cannot help in this matter because their work is wholly technical in nature. After the necessary agreements have been concluded, the institutions will undoubtedly be willing to offer the assistance needed.

ANNEX I

Resolution 8 (IV)

CONSTRUCTION INDUSTRY AND BUILDING MATERIALS INDUSTRY DEVELOPMENT PROGRAMME

The Conference of African Ministers of Industry,

Taking note of the various reports submitted on the Construction Industry and Building Materials Industry Development Programme, especially the Report by the team of experts,

1. Commends the team of experts and the positive work accomplished by it;
2. Commends the Economic Commission for Africa, the United Nations Industrial Development Organization and the Organization of African Unity on the diligence with which they have succeeded in initiating the Construction Industry and Building Materials Industry Development Programme;
3. Urges the Economic Commission for Africa, the United Nations Industrial Development Organization of African Unity to intensify their co-operation in their efforts toward the attainment of the objectives of this programme, especially in following up on the recommendations advanced by the team of experts;
4. Calls upon member States to provide the Economic Commission for Africa, at its request, with statistical and other data to enable it to submit progress reports on this programme to meetings of the Conference of Ministers of Industry;
5. Invites all member States first to take all the measures needed at the national, subregional and regional levels, for the implementation of the programme, and especially to follow-up recommendations advanced by the team of experts and second to furnish practical and effective support to the organizations responsible for the implementation of this programme;
6. Also invites all member States to spare no effort in the pursuance of the objectives and strategies which will enable Africa to achieve self-sufficiency in building materials by the year 2000.

ANNEX II

Resolution 4 (I)

DEVELOPMENT OF THE CONSTRUCTION AND BUILDING MATERIALS INDUSTRIES

The Intergovernmental Regional Committee on Human Settlements,

Noting that there is no single sector of human activity in which construction and building materials do not play a part and that the construction and building materials industries are always the first to act in creating a framework and conditions conducive to the full development of those sectors called upon to establish or improve the structures underlying economic development and to satisfy social or cultural needs (production infrastructure and equipment, housing, services and infrastructure for the majority of the people, etc.),

Stressing in particular the basic importance of building materials as intermediary production factors in achieving the economic, social and cultural purposes of construction and in improving the situation in respect of human settlements and reducing the disparities between town and countryside to an acceptable level,

Convinced that in most African countries despite the very considerable effort deployed by their authorities, a lack of coherent policies, strategies and programmes has created a very worrying situation in the construction and building materials sector, which is reflected not only in a constant outflow of hard currency now used to import building materials and their components, technology, machines, etc., but also in the unsatisfactory use of the natural, human and financial resources available locally,

Recalling, in particular, Commission resolutions 209 (IX) of 14 February 1969 on housing, building and physical planning and 316 (XIII) of 1 March 1977 on accelerated industrialization in Africa and resolution 8 (IV) adopted by the African Ministers of Industry in November 1977 on the construction industry and building materials industry development programme;

1. Notes with satisfaction and approval the co-ordinated action undertaken by the secretariat of the United Nations Economic Commission for Africa, the United Nations Industrial Development Organization, the United Nations Development Programme and the Organization of African Unity to assist African countries in achieving self-reliance in this sector as soon as possible;

2. Invites the Governments of African countries:

(a) To accord absolute priority to the development of the construction and building materials sector;

(b) To use the recommendations formulated by the Meeting of African Experts on Building Materials held at Addis Ababa from 17 to 21 July 1978 1/ as a framework for their programmes and activities;

1/ See the Document entitled "Report of the Meeting of African Experts on Building Materials" (E/CN.14/HUS/24).

(c) To continue their individual and collective support of the various activities undertaken and programmed in this field by the Economic Commission for Africa in co-operation with other international and regional organizations, in particular by:

- (i) Approving within a reasonable span of time the Programme for the Development of the Construction and Building Materials Industries scheduled to be implemented in the following two main phases:
 - the preparatory assistance phase (July 1978-June 1979);
 - the complete-project phase (July 1979-December 1981);
- (ii) By providing the Economic Commission for Africa, at its request, with the statistical and other data it needs to implement the above-mentioned Programme;
- (iii) By allowing the Commission to use, even though only temporarily, the services of their national experts for work in respect of which their competence is required.

3. Requests the Executive Secretary of the Economic Commission for Africa to have the implementation of the building materials and construction development programme, which was hitherto the responsibility of the Housing, Construction and Physical Planning Section, entrusted henceforth to the Human Settlements Unit;

4. Urges the secretariat of the United Nations Economic Commission for Africa to continue to ensure greater co-ordination of its efforts, within the framework of the new institutional arrangements adopted by the Intergovernmental Regional Committee on Human Settlements, with those of other international and regional organizations to assist African countries in the fields recommended by the Meeting of African Experts on Building Materials held at Addis Ababa from 17 to 21 July 1978. 2/ The efforts referred to include planning and programming; the creation or strengthening of institutions and development machinery; the identification, evaluation and execution of national and subregional pilot projects and the search for sources of financing;

5. Requests the Economic Commission for Africa to provide the Intergovernmental Regional Committee on Human Settlements with a report on progress in this sector at the next session of the Committee.

2/ Ibid.

ANNEX III

LIST OF DOCUMENTS PREPARED BY ECA IN CONNEXION WITH THE PROGRAMME
FOR THE DEVELOPMENT OF THE BUILDING MATERIALS AND CONSTRUCTION INDUSTRIES
(JULY 1977-DECEMBER 1978) 1/

1. Programme on Development of Building Materials and Construction Industry:
IND-174
2. First report of the first team of experts on the Construction Industry and
Building Materials Industry Development Programme: ECA/CMI/FCIA.4/WP/5;
ECA/CMI.4/INR/WP/5; E/CN.14/HUS/21
3. Construction and building materials industries in Africa: E/CN.14/HUS/22
4. Components of the policy and strategy for the development of construction
and building materials industries: E/CN.14/HUS/23
5. Report of the meeting of African experts on building materials: E/CN.14/HUS/24
6. Preparatory assistance document for the project entitled "Development of
building materials and construction industries"
7. Building materials and construction industries development programme:
E/CN.14/HUS/29
8. Building materials and construction industries development programme:
Progress report, November 1978
9. Questionnaire
 - A. Raw materials development
 - B. Manufacturing/Processing of building materials
 - C. Research, consultancy and development services
 - D. Construction infrastructure and services

1/ Includes only documents sent at some time to the Governments of all
States members of the Commission.

ANNEX IV

List of proposed projects for the eight countries visited

I. LESOTHO

A. Cement

1. Lesotho is at present dependent on cement imports from the South African cement marketing organization (CMO) which controls the supply and price of cement in South Africa. When there is some demand pressure in South Africa CMO rations the supply of cement to Lesotho. As a result the cement supply in Lesotho is irregular. The mission is now studying three alternative approaches to this problem: (a) construction of a warehouse for cement in Maseru; (b) construction of silos and a packing plant; and (c) a clinker grinding plant.

B. Sawmill

2. Lesotho has no timber resources. All of its sawn wood requirements are imported from South Africa. The mission is studying the possibility of putting up a sawmill in Lesotho to mill logs from Swaziland. As firewood is expensive in Lesotho, there is likely to be good demand for the wood chip from the sawmill.

C. Paint factory

3. The team was informed that raw materials (pigments) for manufacturing paint are available in Lesotho. A thorough investigation of the technical characteristics of the available raw material and the market situation is recommended.

D. Programme for assisting local contractors and up grading the skills of middle level government personnel

4. The problem of lack of skilled construction labour and competent local contractors is acute in Lesotho. The team is preparing a proposal for setting up a training programme for local contractors. The programme can be designed to serve other independent southern African countries, particularly Botswana and Swaziland, which seem to have similar problems.

5. Apart from training needs, local contractors also have problems related to the supply of building materials. Another project idea that has been discussed with Government officials is a co-operative warehouse for building materials. Assistance is needed in the initial management and organization of the warehouse.

II. GABON

A. Proposal for a wood-based project for the subregion

6. Gabon is endowed with vast forest resources and is at present exporting wood in log form. The team is identifying one wood-based project that can serve the subregion.

B. Brick and lime projects

7. Even though Gabon has good clay and dolomite deposits, there are no brick or lime factories in the country. The use of cement blocks and cement is extensive, and so far Gabon has been dependent on imported clinker for its cement production. The team proposes the establishment of small to medium-sized brick and lime factories in the major urban centres.

C. Proposal for a contractor training programme

8. There is a need to up-grade the skills and management know-how of local contractors. The team therefore recommends assistance in this area.

III. BENIN

A. Common codes and regulations

9. After many discussions with agencies in Benin and other West African countries, the team is convinced that a common code and regulations will not only facilitate the exchange of goods and services within the region, but can also replace the existing borrowed foreign codes and regulations not relevant to the region and introduce new ones which truly reflect real needs. ECA in co-operation with other international organizations can look into this problem in much more detail.

B. Assistance for an existing ceramics factory

10. A new ceramics factory started operation in Benin in July 1977. It has encountered some technical, and financial problems. There is a need for an expert or a team of experts to make an in-depth study of the raw materials situation and prepare engineering specifications for any additional machinery that may be required.

C. Glass, brick and lime factory projects

11. There are good clay and dolomite deposits in Benin, but the use of brick and lime is not widely spread. Small to medium brick and lime factories can be put up in Benin, and assistance is required for that. As far as the glass factory is concerned, the raw materials and market situation should be carefully investigated.

IV. TOGO

A. Proposal to enable 'Centre de la construction et du logement à Cécavelli' (Centre for housing and construction at Cécavelli, Lomé) to serve a larger geographical area

12. Since its establishment in 1968, the centre has acquired considerable experience in building materials research and testing, documentation and training. Given some assistance, the centre could serve a larger geographical area. The team is preparing a proposal on how the centre can serve neighbouring countries.

B. Proposal for small lime and brick factories

13. At present, there is substantial unsatisfied demand for lime and brick in many parts of Togo. The team is proposing small lime and brick factories spread throughout the country.

C. Expansion of the marble industry

14. There are good marble deposits in Togo. A market study on the export potential of Togolese marble is recommended.

V. NIGER

A. Proposal for research work on the roofing problem in Niger

15. Most of the houses in the Niger are adobe houses, i.e. use mud for walling and roofing. Adobe houses have good insulation qualities and are therefore very suitable for the Niger. One problem they have is the high incidence of collapses during the rainy season. This problem is attributed to the roof. In view of the urgency of the problem the team recommends that a research institute should be commissioned immediately to study traditional building practices and recommend improvements. Improvements to be considered should include (a) the use of ground-nut-shell particle board for roofing (some work has already been done in this area at Cacavelli); (b) some kind of waterproofing and proper drainage around the house to protect the walls; and (c) use of stabilized earth blocks as domes and vaults for roofing.

B. Technical assistance for Niamey ceramics and brick factories

16. The Niamey brick factory has encountered some technical problems with its kiln. It needs some rehabilitation work, and the team recommends that an expert should prepare the details of the rehabilitation programme.

17. There is one ceramics factory in Niamey which seems to have been set up without a market feasibility study. The team recommends that a market study should first be made before any additional investment is made in the project.

VI. GHANA

A. Lime project

18. Ghana at present imports cement clinker for the production of cement. With the country's current foreign exchange problem it would be appropriate to look for cement substitutes. As there are dolomite and limestone deposits of reasonable quality in some parts of Ghana, the team recommends the establishment of small lime kilns throughout the country.

B. Stone centre

19. There are good-quality building stones in all parts of Ghana, but the use of stone as a building material is not widespread. The Building and Roads Research Institute (BRRI) in Kumasi has a proposal to establish a stone centre which can concentrate on the problems of exploitation of stone, but cannot establish the Centre because of lack of funds. The team recommends that financial assistance should be given to BRRI for this purpose.

C. Wood impregnation plant

20. Ghana is rich in timber resources, and some secondary species are at present not utilized. The establishment of a wood impregnation plant would greatly improve the situation.

D. Research on wood shingles for roofing

21. The roofing materials presently used in Ghana have high foreign exchange content. The team recommends assistance for research work on the possibility of using Ghanaian timber for roofing material.

E. Wood testing centre

22. As Ghana is rich in wood resources, there is a need for a wood testing centre attached to the Forest Products Research Institute that can recommend and advise on special uses and properties of different wood species.

F. Assistance to pilot projects of the Ghana Rural Housing Department

23. The Rural Housing Department of the Ministry of Agriculture in Ghana is constructing some demonstration houses based on the Egyptian architect Hassan Fathi's ideas. The team proposes that assistance should be given to the Department to invite Mr. Hassan Fathi to inspect the demonstration houses and get his recommendations based on Ghana's climatic conditions.

VII. BURUNDI

A. Technical assistance for the Office du Habitat et Logement

24. The office was created in 1974 and is responsible for the construction and management of State-owned houses. It has a very serious staff shortage and urgently requires assistance in the form of one or two experts with civil engineering and management background.

B. Contractor training programme

25. There is a serious shortage of small to medium contractors in Burundi. Training and up-grading of local contractors is necessary.

C. Research on the use of papyrus and banana leaves

26. There are a lot of papyrus and banana leaves in Burundi that are not being used at present. The team recommends that one research institute should be commissioned to study the possibility of using papyrus and banana leaves as building material.

VIII. SUDAN

A. Utilization of agricultural wastes

27. Agriculture has been given top priority in the Sudan's development plan. At present the country's agricultural wastes are not properly utilized. The Gezira Scheme alone produces annually 20 million tons of cotton stalks, most of which is burnt. Experts estimate this to be equivalent to 6 million tons of petrol. It is recommended that a research institute should be commissioned to study the possibility of utilizing cotton stalk, bagasse and papyrus as building materials.

B. Ceramics

28. The Sudan imports all its ceramics and sanitary ware requirements. According to surveys made so far, deposits of kaolin, silica and feldspar are available in different regions of the country. It is recommended that an expert should undertake a feasibility study on ceramics and assist in the selection of a suitable site for a factory.

C. Support for research on small-scale and medium-scale brick production

29. The Building and Road Research Institute in the University of Khartoum has a complement of high-level research personnel specializing in concrete, timber and bricks. The Institute undertakes research projects directly connected with development schemes identified by the National Council for Research (NCR) and others who provide funds.

30. There is as yet no mechanized brick production in the Sudan, and the current traditional method of small-scale production has many drawbacks which the Research Institute aims to determine scientifically before proposing corrective measures to the producers. A study to determine the problems of the small-scale and medium-scale traditional production of bricks has already been initiated by the Institute. To help its specialists in this field the team recommends assistance in procuring some simple laboratory equipment, such as a brick extruder, as well as expansion of work space.