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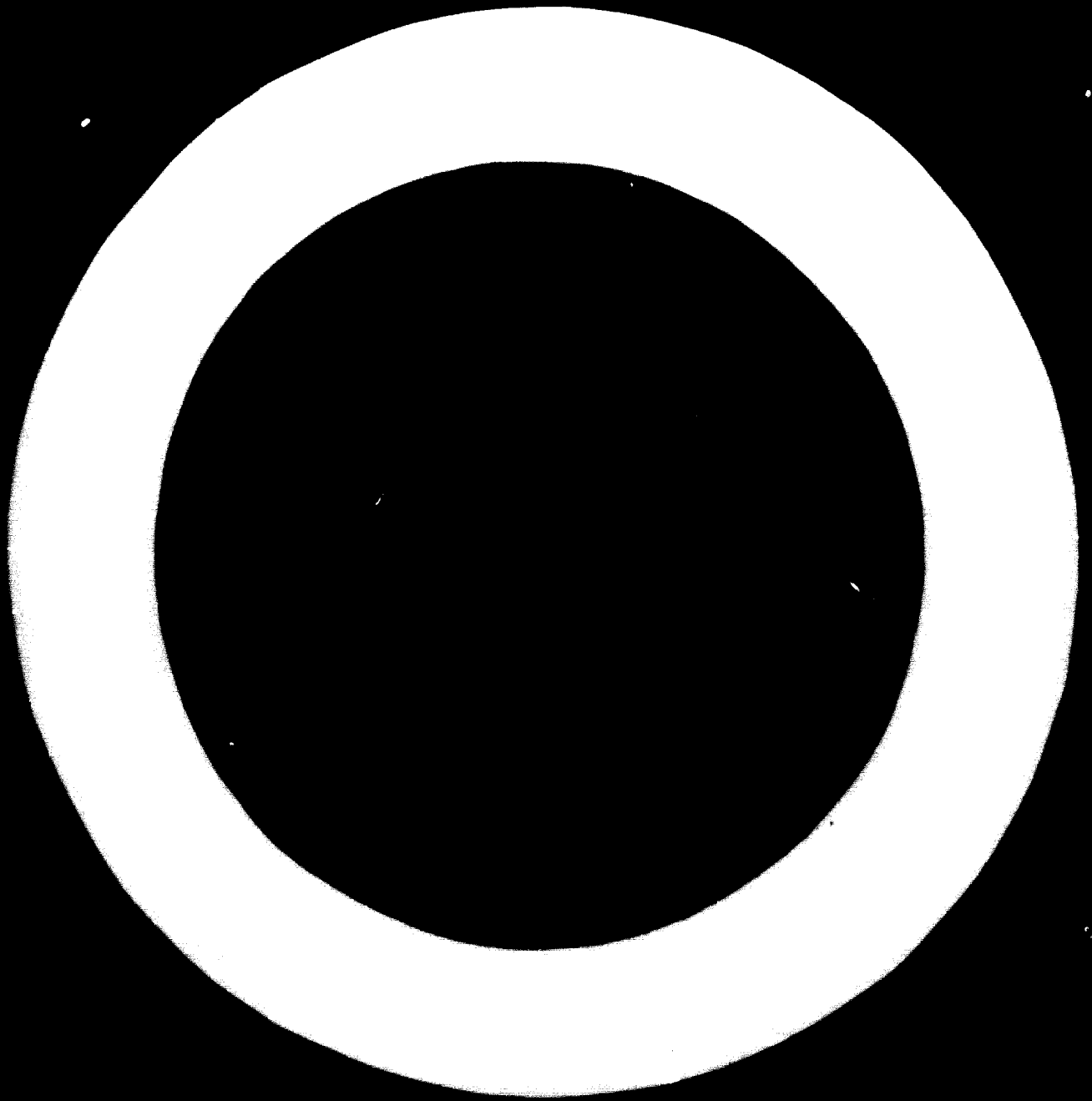
LEGAL, ECONOMIC AND TECHNICAL PROBLEMS IN THE ESTABLISHMENT
OF CONSTRUCTION INDUSTRIES IN DEVELOPING COUNTRIES
With Particular Reference to Kenya ^{1/}

by

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SUMMARY

The contracting sector of the construction industry in Kenya is highly fragmented and exhibits no trends towards diversification. The design sector is distinct from the contracting sector for reasons which appear to stem from the law of liability and result in few engineers being employed by locally based contractors. In Kenya most of the larger locally based contractors are Asian family firms and the Government is naturally endeavouring to encourage Africans to enter this field. So far this seems to have enhanced the fragmentation of the industry.

The innovating mechanisms for the industry which are present in the private manufacturing sector in developed countries are almost entirely absent with no replacement. Nor is there a mechanism for modifying technology, literature or training methods to suit local conditions.

This situation probably exists in other countries and in order to develop tools for changing the industry it is essential to examine the whole industry i.e. the contracting, designing, training and innovating sectors and their inter-relationships. There are potentials for changing the industry through all or any of these sectors but this approach would need some form of coordination at national level.

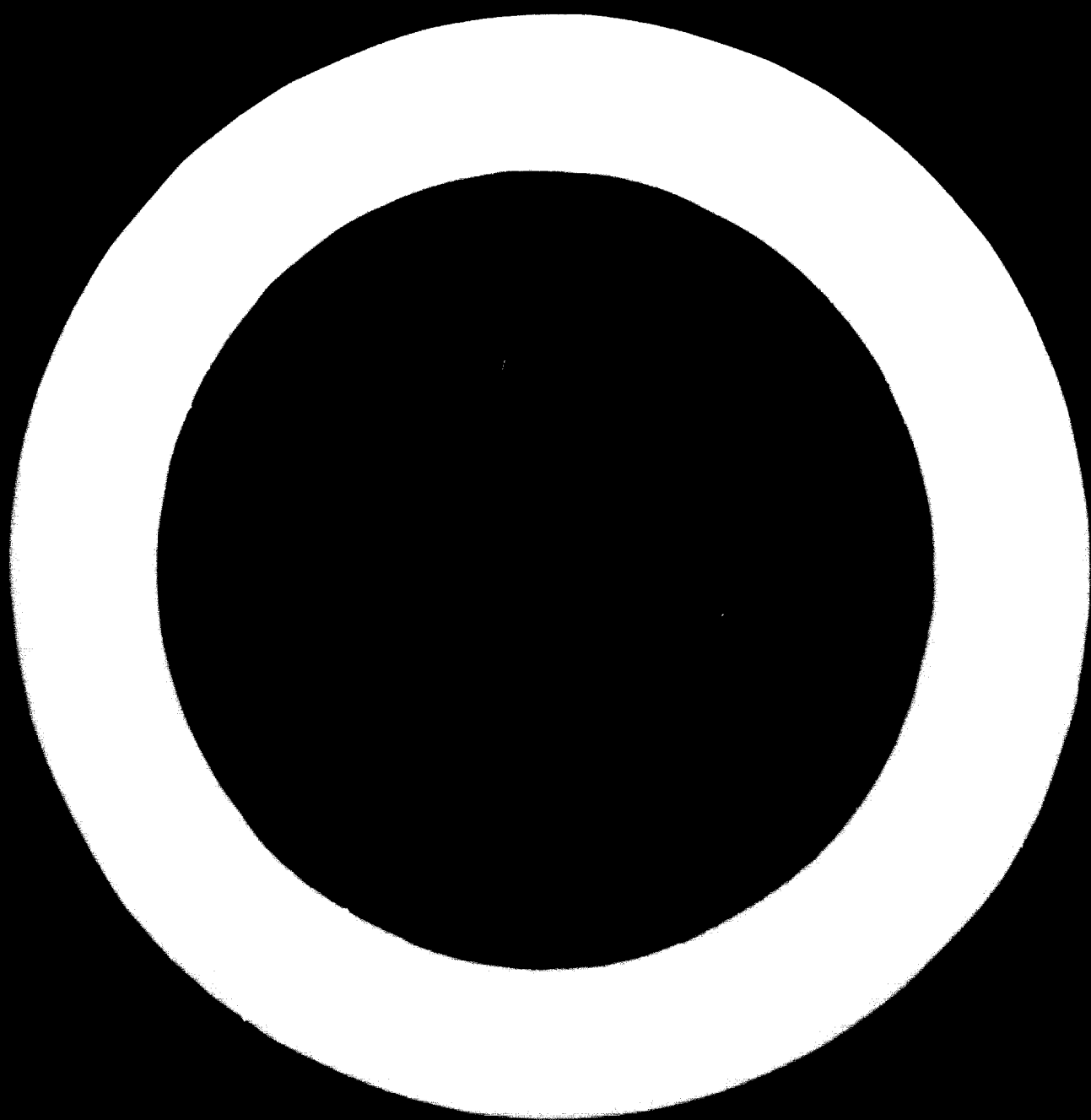
Consideration should be given to setting up some form of international organisation devoted to assisting the construction industries in developing countries. It should be in a position to examine the whole industry including all its related components and advising at both strategic and tactical levels on means of achieving agreed ends.

1. It should be able to make comparative studies of the whole industry in a number of countries determining constraints, deficiencies and tools for changing the industry as well as defining a series of possible objectives for the industry.
2. It would give advice at both strategic and tactical levels to countries on how to establish or develop their construction industries to suit the particular conditions and requirements of the country.

3. It would liaise with bodies concerned with training at all levels and endeavour to encourage some coordination between these levels.
4. It would generate or commission the generation of manuals, texts etc. on various aspects of construction relevant to interested countries preferably on a semi-commercial basis, to ensure adequate dissemination.
5. It would act as a clearing house for information on the special problems of the construction industries in developing countries and advise international and other bodies concerned with this problem.
6. It would seek to encourage the formation of bodies in individual countries which would be able to advise on the coordinated development of the whole industry in terms of the strategy for that country.

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I. THE PUBLIC AND PRIVATE SECTORS IN THE
CONSTRUCTION INDUSTRY IN KENYA.

A. Introduction

In this paper the Construction industry will be treated as including contractors and designers. Strictly, the term contractors relates to building and civil engineering organisations executing works in the private sector but the term contractor will, in this paper, also refer to similar organisations within the public sector. The term designers will include architects, structural engineers and quantity surveyors; those sectors providing mechanical and electrical design services will be dealt with separately.

B. Present trends in the Construction in Kenya. (1, 2)

Over the past five years the construction industry has grown by approximately 13.5% p.a. on current value of investment in capital works or about 10% p.a. allowing for inflation. The division of these works between residential, non-residential and construction and works is given in Figure 1. Also included therein is the division between public sector and private sector investment in the various groups. The private sector investment reached 46% in 1969 since when it has decreased to 33% in 1972. During this period there has also been a gradual shift towards civil engineering works which have increased from 47% of the total investment in 1967 to 51% in 1972.

Present indications are that this growth rate will be sustained though current shortages of materials may impose some constraints.

Figure 2 gives the relationship between the capital contribution of the construction industry to the Gross Domestic Capital Formation which has varied around 40% and was 43% in 1972. Also given is the relationship between the capital formation through the construction industry and the growth in GNP and these are seen to be fairly well correlated.

The data on the capital formation by construction assets does not include the contribution of traditional domestic dwellings which are clearly outside the aegis of the construction industry.

C. Contractors in the public and private sectors. (1, 2)

No data appears to be available to indicate the proportion of works carried out by these two sectors. However some indirect data based on numbers employed in the two sectors shows that in the Construction Industry the percentage of employees in the private sector was 60% in 1971 rising to 67% in 1972. Allowing for the fact that a considerable proportion of the public sector employees are engaged on maintenance works on roads etc. on which the value of works completed per worker is somewhat low, this suggests that between 70% and 80% of the investment in the Industry is executed by private sector contractors.

D. Supporting Industries.

A list of these for Kenya is given in Appendix A. This list is not exhaustive as there appears to be no data upon which to base these and the list must be regarded merely as indicative. The industries in Kenya are all in the private sector though the Government has varying degrees of financial interest in a number of the industries.

E. Legal Aspects.

(a) Kenyansisation.

Many, perhaps, most of the larger construction companies in Kenya are owned and managed by foreigners and many of the skilled intermediate staff are also foreigners. A system of work permits exists covering foreigners and by means of which it is possible to exclude these from various occupations where the Government considers that there are citizens capable of taking over. Such a policy is inevitable but it has led to a number of problems and shortages of some skills. In particular short supply are those skills which had previously been filled by people with no formal training but considerable experience such as site agents and clerks of works.

(b) The hierarchy in the Construction Industry.

As will be shown later in the paper the position of the structural engineer in the design/contractor hierarchy has some considerable consequences. Under the British system the structural engineer is usually

independent of the contractor whereas in those countries where the Napoleonic civil code prevails, he is usually employed by the contractor.

Under the Napoleonic civil code designers and contractors carry a 10 year legal liability for the structures, materials and workmanship and if there is a failure, the onus is on them to prove that they were not negligent. Under the British system no such liability is clearly defined and the onus lies on the aggrieved to prove that the designer or contractor have been negligent. In practice this is not easy. From the French liability requirement has developed insurance requirements and an insurance administered inspectorate which covers all aspects subject to the liability provisions. In Britain, checking of designs and workmanship by authorities is generally of a fairly perfunctory nature though there are exceptions.

These differences in the law have led to different hierarchies in the construction industry in different countries. The difficulty in disentangling the different responsibilities of the structural designer and contractor and the simplicity of an insurance contract being with a single organisation appear to be the reasons why the contractor usually accepts responsibility for structural design in those countries following the Code Napoleon and in consequence employs designers on his staff. Under the British system, structural engineers are an independent profession bearing most of the responsibility for checking the contractors work but generally having no one to check their own work. The difference in the two practices may be enhanced by the very strong position in Britain of the professional institutions and their desire to enhance the status of their members. One result under the British system is that contractors do not have to and often do not employ qualified engineers.

Before discussing this it should be noted that in the British system of organisation of the industry followed in Kenya, nearly all the design functions related to the industry are carried out by designers who are not employed by contractors but are independent and are either in private practice or employed by various Government departments. A considerable number of professionally qualified architects and engineers are engaged on work other than design i.e. administration of various sorts or maintenance work and not related strictly to new investment. The only figures available on the numbers of those professionally concerned with the industry show that in 1967 in Kenya there were 235 architects, 31 quantity surveyors and 415

civil engineers in Kenya. (1) Since then the figures would be adjusted by:-

- i. A known number of graduates from the University of Nairobi
- ii. An unknown number of graduates returning from studies overseas
- iii. An unknown number of expatriates arriving and departing:

Consequently any estimate of total numbers is likely to be very unreliable.

Of the architects and quantity surveyors the majority are in the private sector engaged on design and supervision of new works. Possibly about a quarter of the civil engineers are so engaged in the private sector with perhaps a similar quantity also on new works in the public sector; the remaining civil engineers are involved in other activities. These are estimates only as no data exists.

It should be noted that apart from international construction companies, the local contractors employ very few professionally qualified engineers or quantity surveyors; architects in the British system rarely seek employment with contractors.

The patterns of organisation of Britain and France (and presumably Spain) have been transferred to what are now the developing countries with no doubt, some local modifications.

The writer has not had the opportunity to study this aspect in depth but has been seeking reasons for the differences in hierarchy in the construction industries in different countries. It would appear that the employment or non-employment of engineers by contractors is guided to at least some extent by the type of law prevailing in the particular country. The consequences of these differences in hierarchy appear later in the paper.

F. Technical problems.

(a) Mechanisation.

New plant and equipment is being increasingly introduced into the construction industry in Kenya. There is little doubt that the most economical contract price for a project is achieved by using the most capital intensive equipment possible subject to rather higher utilisation factors than would have to be the case in countries with expensive labour. This however increases

the consumption of foreign reserves and effectively increases unemployment. This dilemma is difficult to resolve and indeed there is probably no mechanism within most economies to do this. A typical example of this is a $10m^3$ road scraper which can do the work of around 10,000 men, costs around \$50,000 and also consumes imported fuel and spares. To replace the machine with men would add considerably to the contract cost unless some system of communal labour exists within the country and this is not the case in Kenya. The alternative of animal drawn scrapers is not possible in a country without a tradition of animal transport.

It is difficult to suggest valid means of approaching this problem which ideally requires a considerable integration of technological and economic skills at a high level and these are in short supply. One approach might well be to apply import duties in proportion to the number of men that the machine can replace but this is a little simplistic.

A further problem arises especially with manufacturing equipment such as is used with timber processing in joinery workshops. It is perhaps trite to observe that simple tools require high skills whilst low skills require automatic equipment. The developing countries possess neither sufficient high skills nor sufficient funds or throughput to justify automatic processing machinery and the resulting processes lie somewhere in between. There is a considerable potential in timber workshops and elsewhere for providing simple means to enable fairly low skills to achieve good quality work by means of special gauges etc. and this need not require high technical managerial skills as it can be provided externally. This leads to the next section which deals with innovation.

(b) Innovation in the construction industry.

Innovation in the context of a developing country is taken to mean the introduction of new processes or methods or equipment by which the quality or quantity of output can be improved subject to perhaps some constraints which have been mentioned in the previous section. Such improvements may be of a very elementary nature and would rarely include very sophisticated technological hardware though there is no reason why advanced theoretical processes should not be used to develop technological improvements.

(i) Innovation by the private sector.

Innovation in the developed countries is primarily initiated by various components of the private sector, secondarily by governments and occasionally (in the construction industry) by universities. The private sector in developing countries is generally fairly small in scale and incapable of very much in the way of market research, product development and design and technological marketing of the product. This is illustrated by the almost total lack of any technological marketing of any building product produced in Kenya which certainly has not got one of the most backward industrial sectors amongst the developing countries. It follows that most of the innovation by the private sector lies in new products from developed countries overseas and in many cases these are not altogether suited to local conditions. There is however no local design capacity amongst the importers to modify these or even to select these with discrimination. Typical of imported products which are unsuited to conditions in Kenya are those which are for external usage and decompose rapidly under the intense ultra-violet radiation in the tropical highlands.

Perhaps more profitably to developing countries would be improvements of a simple nature such as better seasoning of timber or manufacture of concrete. Here the deficiency in Kenya lies in the poor training given, due to the transfer of educational syllabuses from Britain several decades ago and which have not been modified to local conditions. In a developed country deficiencies such as these would be taken up by product Trade Associations such as exist in profusion in Britain and which would provide literature at the correct level, training courses etc. in order to ensure that their products were better used. These trade associations are a part of the private sector and do not exist in Kenya nor probably in most developing countries in respect of materials for the construction industry. Very little of the literature from overseas is useful on site though it may be valuable to designers.

In Kenya and probably in many other countries, deficiencies in the construction industry are neglected by the small private sector and largely ignored by governments as they usually have no facility for entering this field. No mechanism exists for officially observing these and taking action. Many other deficiencies have been observed in the construction industry in

Kenya but these will not be listed here. Most relate to the interface between various components of the building industry and are not within the scope of this paper.

(ii) Innovation by Government

It is obviously desirable that some means should exist for improving the construction technology and if the private sector cannot undertake this the alternatives are either the Government or universities. Repairing defects is seldom a simple matter. By way of example, improvements in training syllabuses depend upon adequate knowledge of local conditions, quality standards, possibly building regulations and so on. The division of responsibilities in Kenya are such that there are few significant improvements which would not require detailed coordination between at least three ministries and altogether the various components of the construction industry may cover as many as seven different ministries.

A Ministry of Technology is one approach but this would be on a very long term and would require very high skills as there are plenty of difficulties even in developed countries in coordinating the pressures from the variety of disciplines and interests involved.

An alternative simpler approach would be through the marketing of technical information at the right levels from technicians to designers of improved methods of carrying out various building and construction processes. Obviously this might well be associated with a standards organisation but would cover a very much wider field and might operate in the manner of an agricultural extension system. This approach is clearly related to the degree of concentration within the industry and this is discussed below.

It may be noted that there appear to be almost no text books or manuals at any level of the construction industry which relate to the sort of skills, equipment and conditions which prevail in developing countries. This in itself is a major deficiency affecting not only teaching institutions at all levels but also those actually engaged on work in the industry. The use of texts designed for developed countries which have different hierarchies of skills and methods of executing works leads to a number of deficiencies in construction methods. Typical of these is the assumption by designers in

Britain that contractors have the skill to design joints in small roof trusses. Such skills do not exist in East Africa but architects follow the British practice and the deficiency is overcome in a variety of unexpected ways.

An organisation devoted to the production of such information would rapidly develop, if allowed, into a building research organisation with more emphasis on research rather than on development work. The reason for this is simple. There are better careers in research than in development technology.

Such an organisation might well be fashioned after the Trade Associations in Britain which are primarily user-oriented, so that there are continuous market studies seeking areas for improvement, the development of products and information to suit this and finally, active dissemination of this information and follow up studies of the effectiveness of the work.

(iii) Innovation by international organisations.

Many developing countries would be unable, for a variety of reasons, to set up a suitable organisation and it is in this field that international organisations might well be able to assist. It should be quite feasible to develop manuals on building in specific countries on an international basis (as much of the material would be common) but it is desirable that this be done on a semi-commercial basis with individual interested governments contributing funds towards such works. Production of manuals etc. would be fairly valueless unless these were disseminated actively in the country concerned and user reactions obtained.

(iv) Innovation by Universities.

Within the British system, engineering courses are primarily academic being followed by several years post graduate experience before the graduate is accepted as fully qualified. It follows that very little if any training is given in design or construction methods in university and in fact the training tends to be highly analytical and biased towards research. This may be valid in Britain but is questionable in developing countries for a variety of reasons which are outside the scope of this paper. One aspect is

however important to innovation. With the highly analytical content and the fact that many engineering teachers in developing countries are from developed countries there is very little contact between university engineering departments and the construction industry. Consequently, there is no real understanding of the problems of that industry and university engineering departments have very little influence on technology.

There is very little likelihood of changing the system significantly as teaching careers depend upon research and most of the sort of work which would be useful to the construction industry would require little, if any genuine research. Moreover a university is not geared to disseminate information to technicians, and without diffusion, even useful work would remain buried in a library and useless.

It follows that if a developing country is setting up a higher educational facility in civil or structural engineering or architecture it should seriously consider whether it requires the institution to engage in development work for the country in addition to its teaching commitment. If it does, then it should ensure that sufficient links will exist between the construction industry and the organisation.

II CONCENTRATION IN THE CONSTRUCTION INDUSTRY IN KENYA

A. Concentration of the contracting sector

Some data is available for Kenya (1) which shows that in the private sector 13% of the contracting firms have more than 50 employees and these firms employ about 88% of all the labour in the industry. This group of large firms totalling nearly 100 in number have an average number of employees of about 210 per firm. This leaves another 325 firms with an average of ten employees each and a similar number with no employees. No information is available on the distribution of labour within the larger firms but there must be many with only 50 - 100 employees and this is typical for smaller organisations running a few small projects.

Another source records that there are over 700 small African contractors who are registered with the Kenya Construction Corporation but that only a small proportion of these consider contracting as their main business activity (3). It is therefore probable that the number of contractors exceeds the 1,000 mark.

A problem which is peculiar to Kenya is that the bulk of the large local contractors are Asian family firms and it is Government policy to encourage Africans to enter this field. This is the *raison d'être* for the Kenya Construction Company which accepts Government work, sub-contracts it out to African contractors and provides financial and technical aid. This is a joint Norwegian and Kenya governments project.

The result of this unavoidable policy is that the industry is very highly fragmented.

Outside the general contracting business are sub-contractors employing about 9% of the total employed in the private sector. In order of employees these include: electrical, plumbing, structural steelwork fabrication and erection, borehole drillers and also a large group classified as "painters, roof tilers and minor repairs" (1).

Except for the last group, these have arisen because of the specialist nature of their work and the first two, electrical and plumbing sub-contractors,

are required to have certain qualifications and be licensed.

A few of the larger general contractors employ their own electrical or plumbing experts but this is uncommon. It is the practice for these areas to be subject to sub-contracts outside the main contract and in such cases the main contractor may of course tender for the specialist sub-contract against outside sub-contractors.

B. Concentration of the design sector.

Virtually all the qualified architects, engineers and quantity surveyors work outside the contracting industry. Exceptions are in the international contracting firms which do employ some engineers. The locally based contractors probably do not employ more than a handful of graduate technologists.

C. Consequences of the concentration of designers outside the contracting sector.

(a)

Nearly all the design skills lie outside the contracting industry and it is the practice to provide contractors with nearly all the design information that they require. Thus contractors are left with the design of temporary works such as concrete formwork etc. and the effect of this can be seen by the standard of formwork on building projects. The only good quality temporary structures are seen on projects from international organisations who generally have some design capacity. There are some other areas such as joints in small timber structures and in joinery which are traditionally left to craftsmen in Europe and are similarly not detailed by designers in East Africa with resulting poor quality work.

(b)

With the deficiency in engineers in the contracting industry there is an acute lack of technical managerial skills which manifests itself in a variety of ways. In particular many of the firms seem unable to grasp new ideas and it becomes necessary for designers to spend a considerable time in detailed explanations on site.

(c)

With most of the design details provided it is possible for anyone with a modicum of building experience to set up a contracting company doing small projects. Whilst this gives a flexibility to the building industry and enables it to expand, a large number of technical problems arise when, for example a company executing \$100,000 projects moves into contracts five times that size as is happening. It appears that this dichotomy of the industry encourages fragmentation.

(d)

It seems probable that this system encourages the entry of foreign contracting firms for large or complicated projects where engineering background is essential to management.

(e)

With the lack of designers within the contracting industry there is very little dialogue between contractors and designers and the latter frequently are not as aware of local conditions as they should and certainly not sufficiently conversant with construction techniques. Very few architects have any conception of building tolerances and cases have been seen in which low cost prefabricated houses required moulded timber instead of sawn timber in order to fulfill the architects requirements.

(f)

The system tends to inculcate a social stratification between designers and contractors which inhibits dialogue and discourages engineering graduates from entering the contracting industry.

D. Some constraints to the entry of engineers into the contracting industry in East Africa.

(a)

The social stratification has been mentioned above and to this needs to

this needs to be added the peculiar racial pattern in the industry in Kenya. Most of the designers are European with an increasing number of Asians. Most of the local contractors other than the very small ones, are Asian. The international firms are European managed.

(b)

A large proportion of the local contractors are family firms and nearly always run by a member of the family without too great a concern for qualifications but, for reasons of social status, seem to prefer to enter the design field and so do not contribute to the contracting industry.

(c)

The university training for civil engineers gives no information at all on contracting and the course is mainly of an analytical nature. This further encourages the concentration of engineers in the design sector.

III DIVERSIFICATION IN THE CONSTRUCTION INDUSTRY IN KENYA

A. The degree of diversification of the industry.

There appears to be very little diversification of either the contracting sector or the design sector outside the area of building and civil engineering construction or design. Several attempts have been made in the past by contractors to enter the field of precast flooring and other products but none have been very successful. The writer has no experience of alternative systems but it would appear that the construction industry could be of considerable value in expanding industry generally through diversification.

B. Causes of the lack of diversification by the contracting sector.

(a) The Contracting Sector.

(i) Lack of design capacity.

Without technologists in the contracting industry there is no significant design capacity or the skills to move into hitherto unknown areas. Basically this follows from the lack of engineers in the contracting sector and this has been discussed earlier.

(ii) Lack of market research capacity.

Given the lack of social and technical contact noted earlier, contractors are not in contact with designers and are unable to appreciate the sort of products for which there is a demand and often expect a product to sell itself.

(iii) Lack of technical marketing skills.

Even if a good product is produced, there is a lack of skill in the technology associated with marketing the product. Typically most design decisions are made by architects and so the technical information must be designed to fit the architects rather specialised requirements. This

requires some knowledge of how designers operate and with designers outside the contracting sector, this is not possible. One locally made product which has sold well, does so on the basis of marketing information which is imported and is good but has one serious defect which has been overlooked by architects unskilled in the area.

(b) The Design Sector.

There should be no technical reason why designers should not be able to set up manufacturing organisations on a small scale so that they can apply there their skills in this direction. The reasons why this cannot at present be done in East Africa is that designers in the private sector are controlled by professional regulations which emphasise their independence from the contracting industry and the object of this is that they should not be influenced by commercial considerations when advising building owners on various contractors, products etc. Consequently they are not permitted to have any interests in commercial activities in the construction industry.

C. Some consequences of the lack of diversification.

These give some examples in specific fields to show some of the indirect consequences.

(a) Timber prefabricated buildings.

There are now at least four organisations making prefabricated timber houses of various qualities and there is a market for these. The manufacturers are all associated with saw mills and none of them have any experience of building generally. Consequently there are many complaints that there is prejudice by the building regulations against timber houses whereas the problem really is non-compliance with regulations which have little to do with the construction material. Needless to say there is little or no design capacity and most of the houses exhibit building defects some of which may take some time to manifest themselves to owners. This does not contribute constructively to the image of timber as a sound building material.

Timber is not always the most suitable material for all the components

of a house and often there are advantages in mixing timber with other materials. Clearly a general building contractor would be better able to handle mixed materials and should have a reasonable knowledge of good building practice and there would be distinct advantages if a contractor with design capacity entered this field of activity.

(b) Precast concrete.

Currently precast concrete work of a specialist nature is done by the general contractor though smaller contractors (and this includes many in the top 100 in Kenya) find difficulty in designing moulds for such work. Most of the other precast work is executed by small firms outside the general contracting industry and these currently make concrete pipes and some small structural members. There appears to be a considerable potential for precast concrete products to reduce the cost of buildings but this is unlikely to occur with commercial precast products in the hands of organisations outside the aegis of the contracting industry as these know little of the market, have no information on building regulations and practice and no design capacity. This is borne out by the history of this industry over the last twenty years.

Interestingly, very recently a new firm has started to make large precast concrete structures. This firm has no design capacity as it is using designs prepared by an engineer outside the organisation and has shown no signs of doing any market research to find out what the market is and how to enter it. The products appear to be quite sound but without active technical marketing to architects who will have little confidence in large structures being sold by a non-designer, it can be confidently predicted that the product will not survive more than a year or two.

Had this been in the hands of a contractor with design capacity the opportunities would have been very much greater for promoting this sort of product. Moreover the contractor could afford to wait for the market to develop as he would not be a "single-product" company.

D. Some approaches to diversification.

It appears that there would be many advantages if contractors could be

encouraged to diversify especially in the manufacture of products for the building industry. This could be approached in two ways.

(a) The provision of information.

Anyone wishing to start a new industry has to acquire all the technical information which is not always easy. Given that such information was available in detail there would still be problems arising and little or no capacity for local contractors to solve or anticipate these. For this they would need at least some technological capacity.

(b) Encouragement of engineers to join the contracting sector.

The possibility of changing the law on the liability of contractors would be too great a hurdle to even consider seriously at this stage. So alternatives must be sought.

In all construction contracts there is a brief description of the technical requirements required of the contractors site agent. There should be little difficulty in persuading architects and consulting engineers to prepare a programme during which they would require site agents on large projects and later, on smaller ones, to have engineering qualifications. Given notice of this, contractors wishing to be considered for such projects would have to employ and train engineers in their methods. This would still not induce graduate engineers to join this sector. However under the British system, graduates are required to complete approved post-graduate training before being accepted as being professionally qualified and there would be little difficulty in introducing a heavy bias towards practical work in the construction sector. This would be administered by the local Engineers Institution. Finally there would have to be some alteration to the undergraduate courses to introduce students to the nature of contracting and attempt to remove the stigma which seems to be attached to this sector.

None of the above would require any great change in any of the existing components of the industry and should not be difficult to "sell". An attempt will be made to accomplish this though it will be five to ten years before the effects will become evident. It should also have the result that graduates (who are mainly African) will be trained with larger contractors and

this will prepare the ground for them in turn to enter the contracting sector in due course for larger projects than could ever be anticipated for most of the present minor contractors and this would be in keeping with the Government's objectives.

IV CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions.

(a)

The contracting sector in Kenya is highly fragmented and racially segmented. Government policy is to Kenyanise the industry and this is currently increasing the fragmentation.

(b)

The design sector is entirely external to the contracting sector in Kenya and this is probably a contributing factor to fragmentation and certainly a major factor in the lack of diversification.

(c)

It is suggested that the law of liability in countries following the Napoleonic legal code may be a major reason for engineers to be employed by contractors and the reverse may follow from English law.

(d)

No significant private sector exists with the capacity for innovation in the construction industry nor is any attempt made by the Kenya Government to remedy this defect.

(e)

It is suggested that developing countries might set up user oriented bodies following the pattern of trade associations in Britain to advise and assist the construction industry.

(f)

The lack of text books, manuals etc. relating to conditions in the developing countries was a contributory factor to many deficiencies in the industry.

B. The Whole Industry.

It is evident in the discussion above that the construction industry is influenced by many components outside its largest sector, the contracting sector. The construction industry is often considered in terms of contractors alone but should also include training at all levels, designers, and the various potential innovating components in the private and public sectors. Any strategy for developing or changing the industry should be based on a study of the whole industry so that the maximum number of options will be available from which to choose the tools for change. The nature of the whole industry will vary between countries and the tools to be used will have to be varied accordingly. A study of the nature of the whole construction industry in developing countries appears overdue and this should be done on an international basis as it will be from a comparative study alone that the different patterns of relationships between the various components will become apparent. From these can be derived the most effective practical tools for change in a particular country.

C. Information.

The lack of texts on conditions in developing countries and which are suitable for use by the industry has already been noted. The writer is particularly aware of this in the field of timber engineering where the transfer of unadapted technology to Kenya has done considerable harm to the image of timber. No facility exists for developing and modifying technologies to suit various levels and conditions in developing countries nor does there appear to be any great understanding of this problem. This is an area well suited to international action as there will be a great deal of common ground. There is merit in generating this on a semi-commercial basis so that a contract exists to supply certain suitable manuals, texts etc. to a particular government and that government agrees to take active steps to disseminate the information in some agreed fashion.

D. The design sector as a tool for change.

The use of the design sector as a means of improving and changing the construction sector may not be very popular on the international level as evidenced by some remarks of Chadenet of IBRD who is reported as saying that

"there are far too many projects which depend upon the wholesale transfer of foreign technology and equipment" (4). This is a very fair comment but there is little information on how to tackle this problem. On a small scale the writer has been developing technologies in timber which have proved suitable and economic for conditions in Kenya and there seems little reason why this approach should not be applied to other materials and also on the larger scale in respect of the special economic and labour conditions in developing countries.

The use of various documents issued by designers to improve the technical level of contractors is relatively easy but the mechanism and details rarely understood by designers and especially by those with little experience of contracting in developing countries. This tool can evade many of the problems of training contractors on site or taking them away from sites for this purpose. It appears that it could be a very powerful and sensitive tool with a fairly rapid response for the improvement of technology and may also have applications in improving management quality.

For this to be used effectively a fairly detailed study of the possibilities and responses would have to be made but so far as the writer is aware there is no organisation with the design and contracting experience in developing countries to do this. Clearly international firms which have been "guilty" of "wholesale transfer of foreign technology and equipment" would not be capable of advising on this. This again appears to be an area on which an international approach would be necessary.

E. Standard designs as tools for change.

The writer has been made aware of the opportunities for using standard designs to improve the technology in the in the case of timber engineering and it is evident that similar advantages would accrue in precast concrete and in many architectural details. Such standard designs have been produced in the developed countries by the private sector with interests in promoting particular products and are very effective. The facility for so doing in developing countries generally does not exist nor is there often the skilled manpower or information to do this; in fact there is frequently a shortage of designers. This is an area in which an international organisation could usefully contribute, probably on a semi-commercial basis. The result could

be to produce some good, but not necessarily high quality standards of construction in some particular sphere and would give the opportunity for educating contractors and designers, of by-passing designers where desirable and of encouraging contractors to engage in product manufacture. It is doubtful if this could ever be done on a significant scale by many developing countries and in the writer's experience, it is probably not desirable to encourage international commercial interests in this field. The only way then that this strategy could be pursued would be by some international body.

F. Recommendations.

Consideration should be given to setting up some form of international organisation devoted to assisting the construction industries in developing countries. It should be in a position to examine the whole industry including all its related components and advising at both strategic and tactical levels on means of achieving agreed ends.

1. It should be able to make comparative studies of the whole industry in a number of countries determining constraints, deficiencies and tools for changing the industry as well as defining a series of possible objectives for the industry.
2. It would give advice at both strategic and tactical levels to countries on how to establish or develop their construction industries to suit the particular conditions and requirements of the country.
3. It would liaise with bodies concerned with training at all levels and endeavour to encourage some coordination between these levels.
4. It would generate or commission the generation of manuals, texts etc. on various aspects of construction relevant to interested countries preferably on a semi-commercial basis, to ensure adequate dissemination.
5. It would act as a clearing house for information on the special problems of the construction industries in developing

countries and advise international and other bodies concerned with this problem.

6. It would seek to encourage the formation of bodies in individual countries which would be able to advise on the coordinated development of the whole industry in terms of the strategy for that country.

APPENDIX A

List of supporting industries in Kenya

Cement manufacture
Precast concrete pipes
Concrete roofing tiles, paving slabs
Precast concrete structures
Concrete blocks
Asbestos cement (shortly)
Steel rolling of rods and light sections
Galvanising
Sheet rolling
Nails, screws
Locks, hinges
Steel windows
Sawn timber
Plywood
Chip Board and Fibre board (shortly)
Timber prefabricated housing
Timber windows
Pressure and diffusion treatment
Soil poisoning
PVC piping
Paint
Straw Board
Clay tiles and bricks and hollow pots
Furniture, joinery in timber and steel
Aluminium windows

This list is not exhaustive

GROSS DOMESTIC CAPITAL FORMATION KENYA

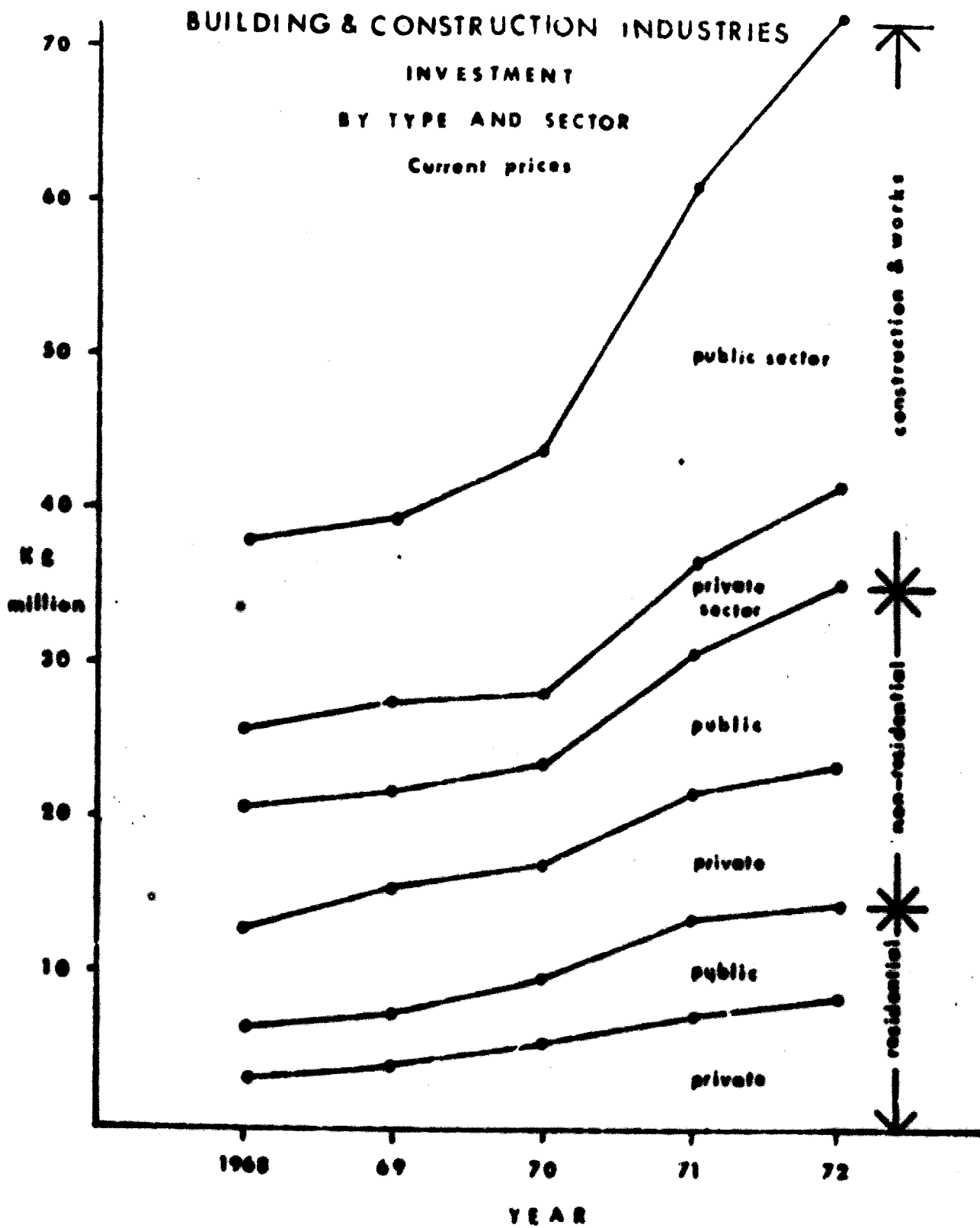


FIG. 1

BUILDING & CONSTRUCTION INDUSTRIES
KENYA
CONTRIBUTION TO GDCF & GNP

Current prices

KE1=US\$2.9

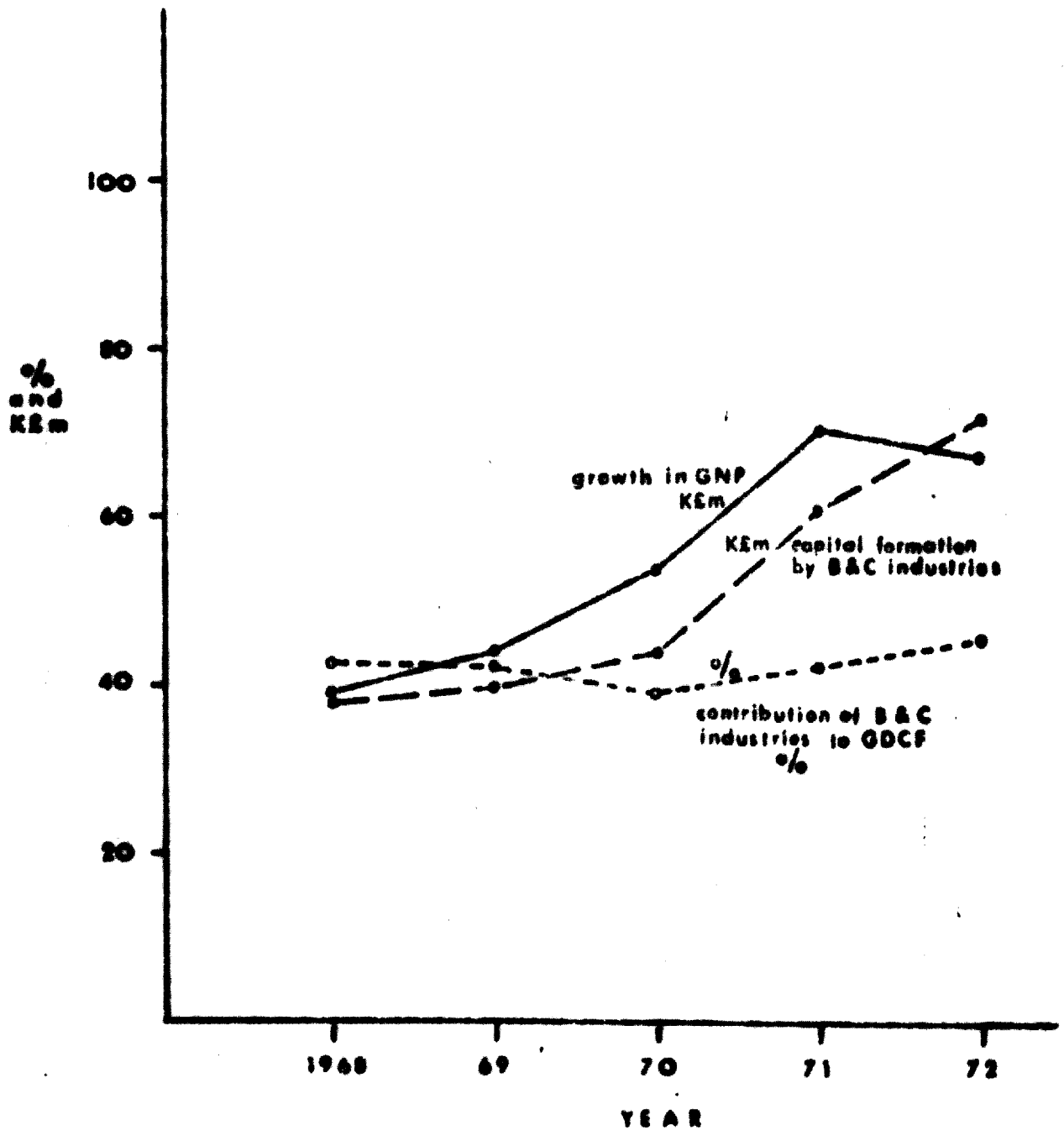

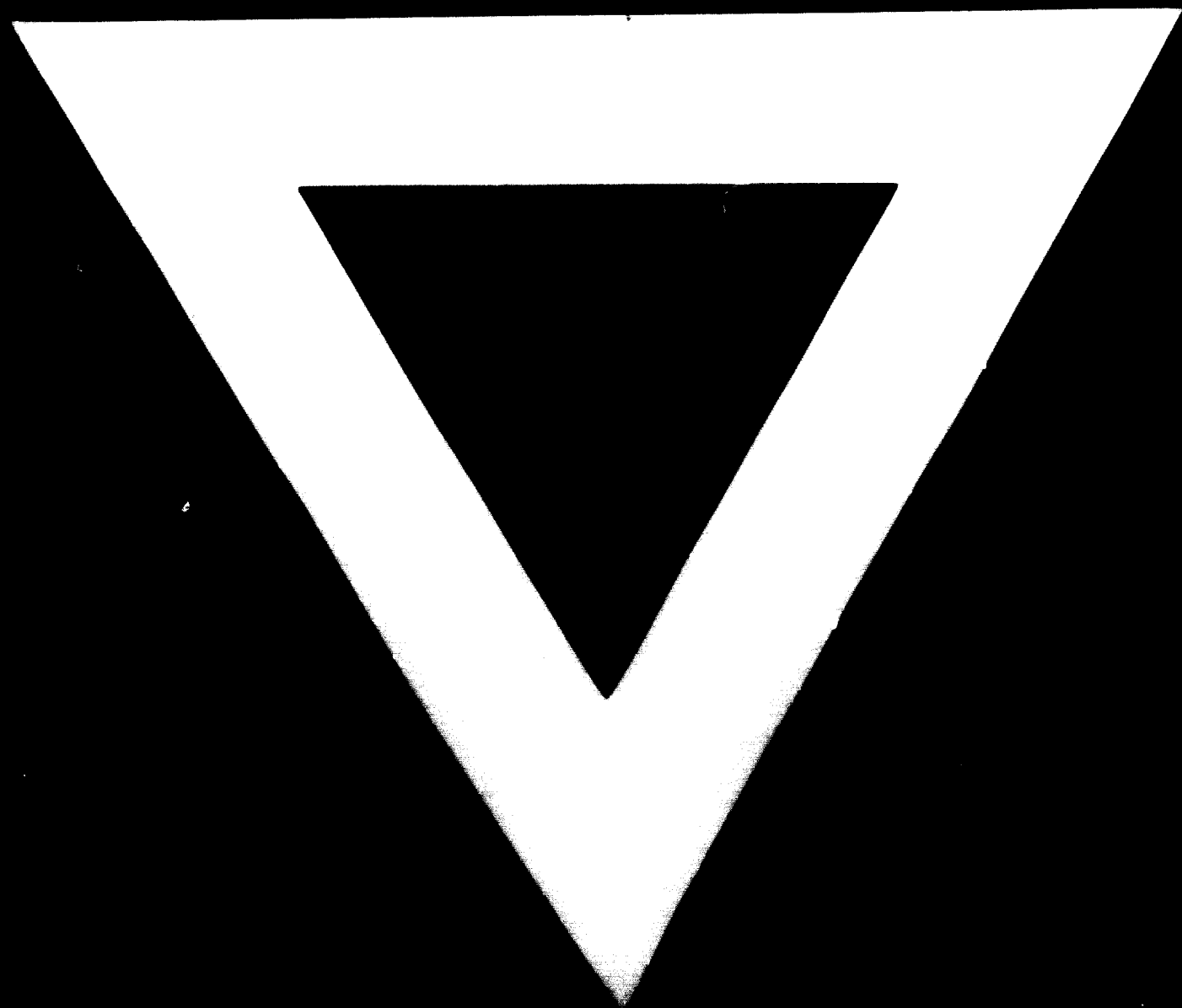


FIG. 2

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