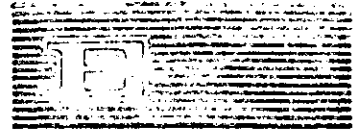


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LIMITED
E/CEPAL/CONF.70/L.8
25 September 1979
ENGLISH
ORIGINAL: SPANISH

CEPAL

Economic Commission for Latin America
Latin American Conference on Human Settlements
Mexico City, 7-10 November 1979

BIBLIOTECA DE REFERENCIA
Servicio Editorial y de Traducción



MEANING AND SCOPE OF TECHNOLOGY IN
HUMAN SETTLEMENTS



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Trial	Control (n=10)	MCI (n=10)	AD (n=10)
1	85	75	65
2	85	75	65
3	85	70	60
4	85	70	55
5	85	65	55

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1. *Pharmaceutical industry* – The pharmaceutical industry is the largest of the three industries, with sales of \$10.5 billion in 1997. It is the only industry that has a significant presence in all three markets.

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1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 26

2. $\frac{1}{2}$ 3. $\frac{1}{2}$

$$\frac{d}{dt} \left(\frac{\partial L}{\partial \dot{x}} \right) = \frac{\partial L}{\partial x} \quad \text{and} \quad \frac{d}{dt} \left(\frac{\partial L}{\partial \dot{y}} \right) = \frac{\partial L}{\partial y}$$

1. *Chlorophyll a* (Chl *a*)

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1. Definition and basic concepts

Human settlements technology is a new concept which relates to the long-established activities of constructing and reconstructing the human habitat. Mankind has created, abandoned and very often reinvented different techniques for the settlement of population, but this knowledge forms part of a number of separate disciplines and has not - as occurs with industrial technology, for example - been subjected to thorough examination from the social and economic viewpoints.

However, in Latin America and the Caribbean, as in other parts of the world, human settlements technology has been developed from time immemorial - in other words, a complex of knowledge concerning the manner of occupying an area, organizing it and equipping it for human life, constructing housing and community buildings and supplying the services necessary for human settlements.

From a historical viewpoint, it is possible to note the way in which these techniques have changed in the light of the capacity of the society to use the resources of nature, but even more so as a result of cultural factors, which in the final analysis take shape in a style of life. These evolutionary processes have sometimes been disturbed, and at the same time enriched, by exogenous influences. This happened during the period of European occupation, and something similar seems to be happening at present as a result of the adopted (or imposed) model of development, which in fact corresponds to a different style of life.

Within the region, the historical approach to the activity of constructing and reconstructing the habitat is frequently hampered by a distortion which causes housing to appear as the only, or at least the most important, activity. In the last four decades the interest of the private sector, and certainly that of the private sector, in housing questions has been focussed almost exclusively on the promotion, construction and financing of housing.

This viewpoint has also been partial in that it regards as technical only those activities which are founded on academic knowledge and its conventional technical derivatives, leaving aside all empirical knowledge. Empirical
/knowledge is

knowledge is frequently the product of years, often centuries of accumulated experience which is transformed into solutions whose effectiveness has been confirmed over long periods of testing.

The third factor which hinders this viewpoint is to be found in discrimination against any good or service which cannot be distributed through the conventional market. There is in fact a tendency to draw a sharp distinction between the production of such goods and services, to which "technical" concepts are applied, and their distribution, which constitutes a "social" activity that does not necessarily have any links with production.

This manner of viewing technological aspects as unconnected with the social and political reality is perhaps the greatest obstacle to accurate understanding of the meaning and scope of human settlements technology, especially if this technology is conceived as the knowledge which makes it possible to maximize the social use of techniques.

Hence it is necessary to specify the conceptual framework which has been used in this work and, accordingly, to define some basic concepts.

A human settlement may be defined as the action and the result of occupying, organizing and equipping an area for adaptation to man's needs. The action is a process which involves political, social and economic aspects. The result comprises the material and institutional structures (habitat) which result from the historical process of settling a population in the cultural medium and in the natural environment.

It is important to note that this conception of the term falls within the framework of the recommendations of the United Nations Conference on Human Settlements (Vancouver, 1976), and that, accordingly, housing, infrastructure and services - in other words, the material part of the settlement - form part of a much wider set of preoccupations in which emphasis is placed on the overall political aspects.

Human settlements technology may be defined as the organized body of knowledge by means of which a given society constructs and continuously reproduces its habitat. In a definition of greater political range, one might speak of the knowledge which makes it possible to maximize the social use of techniques within specific socio-cultural contexts.

/Various types

Various types of knowledge may be distinguished within technology applied to human settlements: (i) techniques for transforming resources into goods and services; (ii) the effects of these techniques on the society as a whole and on the environment and (iii) the pattern or specific form adopted by the material and institutional structures of the habitat in a culturally and ecologically defined medium.

A technique is knowledge of the specific forms in which factors (resources, inputs) may be combined within systems for the production of goods and services - such as urban and rural housing, infrastructure and services (henceforth termed HIS, for the sake of brevity) - and within forms of institutional organization of the functional relationships between the needs of the urban and rural population and the meeting of those needs by the public sector.

The use of techniques, which represents the second level of technological knowledge, deals fundamentally with the effects produced by the application of techniques for the production and distribution of HIS on the organization of society and on the environment. Knowledge of these effects is of great importance in rationalizing human settlements policies and guiding the relations between society and environment.

Design is a third type of knowledge which relates to the formal expression of the application of specific techniques within contexts which are culturally and ecologically defined and which, as a result, incorporate within that formal expression the cultural values and symbols of a given society. Thus, for example, Arab peoples applied traditional construction techniques in order to design medium-sized towns, which constitute genuine micro-ecosystems that change the conditions of the natural environment.

2. The transfer of technology

Processes of cultural dissemination are not always perceived as a part of the political strategy, but there is no doubt that there is a clear correlation between economic dependence and cultural dependence. When one imports a technological product, one is inevitably importing a specific view of the world and entering into a system of mutual relations which may not always fit in with the political destiny of the persons or nations involved.

/For example,

For example, when one buys a car one is entering into a system of relations which includes the petrol station, the garage, the insurance company and the state itself. Hence the choice of techniques and their use within national and local contexts has a political character which should not be ignored.

It is obvious that within the model of development which the developing countries have chosen, or which has been imposed on them within the prevailing economic order, technology is an imported factor. This situation, which makes itself felt in the techniques for population settlement, has led to the introduction of strange forms in the structures and services which in many cases do not prove very functional for the majority of the population. Imported techniques do not generally adapt to the ecological, cultural and economic conditions of the population, principally because they are the result of specific responses to natural and social conditions which are very different from those which prevail in Latin America and the Caribbean, especially their tropical areas. There are, in fact, no developed tropical countries which offer paradigmatic models of life styles or habitat models - or, for that reason, technological models for human settlements. For example, air conditioning is an expensive and energy intensive solution which can be eliminated in most cases by the use of architecture suited to tropical conditions.

The fact that certain models of development, of life and of habitat have served as a pattern for human settlements during the formative stages in the developing countries should not justify the imitation of such models. When processes of cultural self-assertion are initiated, generally in the form of the emergence of nationalist policies, alternative models usually appear which struggle to replace the models imported during the periods of economic dependence, which are also periods of cultural dependence. The new models involve new values and, as a result, different demands for H.S. Nevertheless the processes of renewal may be slow because of the durability of the material forms and social inertia, which is a particular feature of institutional structures.

However, it is these values which are linked with new, more efficient forms of development in order to achieve the advancement of individuals and of society. These forms are therefore opposed to the imitation of imported /forms, which,

forms, which, because they originated in different social and ecological conditions, have alienating effects on the local cultures and frequently give rise to processes involving the destruction of the environment.

3. Criteria for the choice of appropriate technology

A technology is appropriate if it is suited to the specific conditions of a given place. This relative concept lacks practical consequences in the absence of a definition of the criteria which determine when a technology may be regarded as appropriate. These criteria are, basically, of a socio-economic, cultural and ecological nature, and are derived from the general development policy, on the one hand, and on the other, from the characteristics of the place where the technology is applied.

The macro-socio-economic criteria must establish the parameters within which the features of the specific techniques can be determined. Thus, for example, it will be necessary in some cases to adopt labour-intensive techniques, while in others it will be preferable to use capital-intensive techniques. In some cultural contexts techniques which stimulate creativity and social solidarity may be regarded as appropriate, while in others those which emphasize individualism and reliance on the market may prove suitable. At a specific time and place, the appropriation by society of the profits generated by production may be desirable, while in another context the private appropriation of these profits may be preferable. In certain circumstances respect for the environment may be an essential condition for the application of appropriate techniques, while in others the rapid growth of the economies will prevail over ecological considerations.

These examples merely indicate the margins within which the criteria which serve to define appropriate technologies can move, and in no way constitute the expression of preferences a priori. These preferences are a matter for political decision, which falls exclusively to national governments and local authorities.

It should be pointed out that the adjectives generally used to describe techniques - modern, traditional, empirical, endogenous, intermediate, soft, hard and so on - lack political meaning and serve only descriptive or analytical purposes.

/The application

The application of the concept of appropriate technologies serves to indicate the need to transfer exogenous techniques when the circumstances in the original context coincide with those of the place of application; to recover empirical techniques which are of potential value within certain contexts; to introduce new methods and procedures for the application of specific techniques or, finally, to generate new techniques (by means of processes of research and development), when the existing knowledge is inadequate to meet specific technological demands.

4. Technology policies

In general, policies are taken to mean the group of objectives and instruments which serve to establish the purposes of the authority with regard to a specific aspect of government business. When the policies are explicit, the objectives are presented as official statements which can include the definition of targets (sometimes quantified) and the specification of the corresponding policy instruments. The latter are made up of legal provisions, the organizational (institutional) structure and operational machinery.

Frequently the policies are not explicit and the instruments to be used are not defined. These policies may lack appropriate instruments, but never lack purposes. It is always possible, as a result, to "reconstruct" the implicit objectives in the light of more general policies and the real structure of power. In the case of technology, the human settlements policy is always a policy derived from the development model adopted by the country and the nature of the dominant socio-economic structures.

As the overall process of development involves in a very important way the constant rationalization of political structures and machinery, one may assume a tendency towards greater explicitness in human settlements policies, which so far have mostly remained implicit and subordinate to policies for social welfare and investment in infrastructure. Political paternalism and administrative centralism, which are characteristic of most of the countries of the region, have hampered the development of local policies, but there is no doubt that any attempt to increase the rationality of public administration /will lead

will lead to a rise in the participation of the people in the adoption of political decisions which, as in the case of technology applied to human settlements, directly affect the every day lives of individuals.

An explicit human settlements policies should, at all events, include definitions of the role of technology within the framework of overall development and criteria for the identification of techniques which are appropriate for the country in general and for human settlements in particular.

Although it is indisputable that the adoption and implementation of policies is the prerogative of the authorities of each country, one may point to some general characteristics which make it possible to note certain differences, firstly between the developed countries and those which are generally known as underdeveloped or "developing"; and, secondly, between groups of countries in the Third World. These differences lie fundamentally in the extraordinarily rapid growth of population and urban concentration; in the slow provision of economic infrastructure and in the meagre scientific and technological capability of the poor countries compared with the industrialized countries. With high rates of urban growth, considerable demand for investment in the economic sectors and little power to create indigenous technologies, the options available to the nations of the Third World as regards human settlements technology are very different from those available to countries whose urbanization processes have stabilized and which have infrastructure and technological resources which can be transferred to housing.

As a result, not only is human settlements technology a new way of describing a very old activity; the most important element is the intention accompanying the term - to rationalize as much as possible the occupation, organization, equipping and use of space for its adaptation to human needs. The effort of rationalization implies the political aim of bringing the technology applied to these activities into line with the social and economic objectives of development.

