

Transport Planning Requirement of Devchuli Municipality

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Abstract

Original Research Article

Purpose: Transport facilities help in developing access with the rural-urban linkages. Road accessibility can reduce isolation, stimulate crop production and marketing activities, encourage public services and help to transfer technology. The research is to analyze the transport planning requirement of Devchuli Municipality. **Design/Methodology/Approach:** Paired t-test were also carried out to test the possible effect of MTMP to the shopkeepers owners from the formula $t = d' / (Sd / \sqrt{n})$ Where, $Sd = \sqrt{\Sigma(d-d')^2 / (n-1)}$ $d' = \Sigma d / n$. **Findings/Result:** The major problems in the road section was found dusty earthen surface, no required side drain and footpath, no required retaining structures, sharp bends and no traffic sign and signals. Municipality is also facing about problems of Bus Park, Right of Way and Setback issues. MoFALD initiated the concept of MTMP. The major purpose of MTMP is to integrate/tie up the various sectors in well managed municipal road networks. MIM, IDPM, VCDP, MTPP are the major features of MTMP. This road provides various services to the people and have high potentials. Municipality has set visions surrounding it. Various sectorial developments can be achieved after proper implementation of MTMP. It was found that MTMP is rational due to overloaded traffic vehicles and high potentialities surrounding ring road. The responses and expected developments made MTMP legitimate. **Originality/Value:** Proposed road and its structure, adopted planning process and participation of stakeholder made it feasible. Participation of political persons and beneficiaries in preparation of MTMP and their responses showed politically viable and socially acceptable while assessing implement ability of MTMP.

Keywords: MTMP, Finance, requirements, compliance, factors, DTMP

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1. INTRODUCTION

Transport facilities help in developing access with the rural-urban linkages. Road accessibility can reduce isolation, stimulate crop production and marketing activities, encourage public services and help to transfer technology. Road building has been seen to bring about notable enthusiasm and visible changes in rural life. Road infrastructure is considered as “the infrastructure for infrastructure”. However, in the absence of notable criteria and rational guidelines, road construction is carried out in adverse manner resulting in haphazard use and wastage of limited resources (Mishra, Sah & Aithal, 2020; Aryal and Mishra, 2019).

Previously Ministry of Federal Affairs and Local Development stepped up to bring forward proposal to create additional new municipalities from those urban and semi-urban settlements by combining prevalent Village Development Communities.

2. PROBLEM STATEMENT

Municipalities are facing different problems due to the lack of proper transportation planning. They are getting problems in Right of Way (RoW) and Set Back settings, building and other infrastructure construction drawing approval and expansion of various physical infrastructures such as drain, solar light, water supply system, and footpaths. Social issues are also emerged. People are deprived from getting easy services due to scattered and haphazard physical infrastructure construction. After the destructive earthquake in Nepal in 2015, people realized that many municipal roads are even unable to pass ambulances and firefighting vehicles. People want the integrated facilities where all the required services can be taken easily and effectively (Adhikari, 2016).

It needs a proper tie up between the other service areas and the road networks. But the existing

municipal roads are failed to tie up/integrate the other facility areas. These all problems can be minimized by applying proper transportation planning in municipality. MTMP is one of the best planning tools for it.

3. OBJECTIVES

The overall objective of the research is to analyze the transport planning requirement of Devchuli Municipality.

4. LITERATURE REVIEW

4.1 plan

A plan is typically any diagram or list of steps with timing and resources, used to achieve an objective. It is commonly understood as a temporal set of intended actions through which one expects to achieve a goal (Williams, 2010). It is also evidence of an explicit allocation of resources to the task and the means to mobilize additional external resources (Mishra, 2020).

Plan is the pilot road to achieve the desired goals which are set by organization. Broad and intense decisions can be taken with the help of proper and justifiable plan where the allocated resources may be limited. Plan run the organization in a required time frame but it should be put in proper particular operation to get those expected outcomes in given time frame.

While talking about the context of Nepal, if plan is prepared to develop certain community, then it is called Community Development Plan. Furthermore, plan to develop various specific sectors such as education, forestry, health; transportation is called Sectorial Development Plan. On the other side, plan which is prepared for municipality/district is Municipality/District Development Plan and plan for the entire national development is National Development Plan (Mallik, 2012).

4.2Planning

Planning is a process of preparing in advance, and in a reasonably systematic fashion, recommendations for programs and courses of action to attain the common objectives of the community.

A planner may use the planning process when addressing a single subject or a wide range of subjects, such as capital improvements, housing, or transportation. Comprehensive planning covers a wide

range of interrelated topics that are of concern to the community.

In case of local level or community level planning, local volunteers and planners can employ the same planning process that professional planners use. As the definition, when local bodies engage in planning, they seek answers to such fundamentally important questions such as what are the common goals and objectives of community or local bodies. What might happen to local bodies in the future? What do people want to happen? And how best can people achieve the future outcome people desire?

Community level plan in order to improve the quality of public choices and decisions. Having a community plan is worthwhile because planning is a means of preparing for the future. Planning enables to look before leap and avoid costly and sometimes embarrassing mistakes. Through planning, people come to understand what must be done now and in the future to achieve goals. For a community, planning involves working together to balance competing interests. Planning also forces people to think and organize their time, resources and efforts. Planning helps the community recognizes its priorities. With a master plan, local officials can address the most urgent needs first. Planning is intended to serve the public interest. Planning does not attempt to stop or replace market forces of supply, demand and price, but to guide those forces by establishing rules for development and growth. Planning helps the community set sound policies for development. A community plan makes it easier for private developers and builders to respect and understand community desires and public policies as they develop their individual projects. Planning helps identify both the positive and negative aspects of community. What is good should be protected; what is bad should be changed; what is possible should be done. Planning helps to maintain a satisfactory quality of life. In towns with a decreasing population, planning may offer ways to maintain a positive quality of life and revitalize the community. In growing communities, planning offers a way to protect and, if possible, enhance the quality of life. The planning process is a means of educating people about their community. Developing a community plan provides an opportunity for public participation in the decision-making process (Rodrigues *et al.* 2012).

The Planning Process

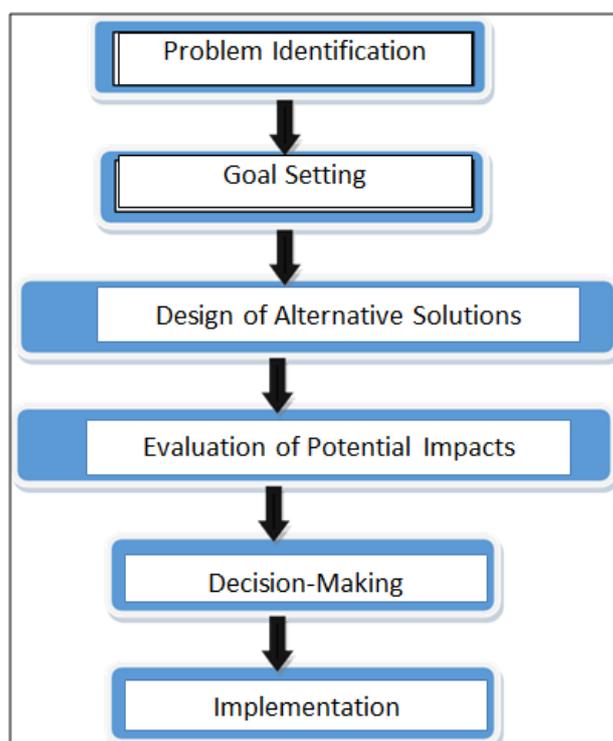


Fig-2.1: Standard Planning Process (Rodrigues *et al.* 2012)

Local Government Operation Act, 2074 has made local government responsible for local level planning. The local government (Municipalities) is totally responsible for planning and implementing local level projects. These bodies shall have to formulate a periodic plan for at least five years. Participatory and Bottom-Up Approach is adopted for planning process (GoN, 1999). They prepare Municipal Development Plan (MDP) annually on the basis of periodic plan. The municipalities are also encouraged to prepare a vision plan (Strategic Development Plan) of the concerned municipality in a participatory manner. The strategic development plan basically defines 20-year development goals in different sectors for the district and is essentially a Perspective Plan (Pokhrel, 2013). Municipalities also follow the following steps of planning procedure (previously 14 Steps) as these steps are widely used in local level planning. The different steps of Participatory and Bottom-up Planning Approach are as mentioned below:

- Step 1: Municipal budget is determined.
- Step 2: The District Development Committee prepares an
2. Municipality adjusts guidelines and circulates to its ward committees.
- Step 3: DDC organizes a pre-planning workshop to
3. Ward leads community-level meetings and lists needs-based plans registered community groups submit plans directly to ward.
- Step 4: Municipalities/VDCs should prepare an

4. Ward priorities plans from the listed/submitted plans and forms a final list. Ward can also propose plans.

- Step 5: A pre-planning workshop at the ward level is
5. Plans received from ward prioritised and revised by municipal sector units (e.g. health plans by health committee, infrastructure plans by purwadar samiti) Sector units can also propose plans.
- Step 6: After collecting the proposals from the settlement
6. Plans from all sector units combined then classify the projects endorsed by the Integrated Plan Formulation Committee and presented to review and to the municipal assembly for approval.
- Step 7: The proposals for the projects collected from the
7. Municipal Assembly approves list of plans in a public meeting and budget is allocated.

The projects which cannot be financed by the Municipality are endorsed to the Province Government and other Central Government Ministries, which are then discussed in the National Planning Commission (Mishra and Magar, 2017).

4.3. Master Plan

A "Master Plan" is broadly defined as a plan that meets the parameters and intent of the specific plan statutes contained in the government code, which

requires a land use plan, a circulation plan, an infrastructure plan, and implementation measures. The requirement for a Master Plan might be fulfilled by a variety of planning tools, including a specific plan, a comprehensive plan, a community plan, a special planning area, or any combination thereof. The country's decision to utilize this planning process acknowledges that the project possesses complexity that requires a coordinated and comprehensive planning process. Master plan and its planning process contain various benefits. It provides a clear picture of the figure regarding development of an area. It allows for a broad range of detailed information, beyond that usually obtained in traditional zoning application, combined into a complete package. It provides detail about project phasing and infrastructure and precisely correlates infrastructure with project land use avoiding the costly oversizing or detrimental under sizing of infrastructure. It provides an opportunity for citizen participation before the public hearing process developing understanding, acceptance and support for the project design. It allows some flexibility in zoning and development standards which results in developments that are more responsive to the unique conditions of the site and allows a project to respond to changing market condition over time. The ability to establish a "master" or "tiered" environmental document, including appropriate mitigation measures, thus facilitating the consideration of subsequent development proposals (Country of Sacramento, 2012).

MTMP is one of the master plans for transportation sector in municipality. MTMP is prepared for improvement and new construction of various classes' municipal roads. The MTMP is to be prepared every five years and provides a prioritized list of interventions for the municipal roads that can be carried out with the estimated budget for the 5- years MTMP period. Each year the planned interventions are further detailed in the Annual Work Program of municipality, adjusting the plan according to the actual budget and requirements.

This master plan is designed to take account of the real needs of the people for infrastructure as per the Comprehensive Town Development Plan. Until the Comprehensive Town Development Plan is prepared, the municipality will prepare intermediate visionary plan. Based on the visionary plan, MTMP shall be prepared so as to harmonized with DoLIDAR's Approach Manual to maintain similarity so that municipal transport network can be overlaid to the respective DTMP/other MTMPs to prepare local networks.

The planning approach is participatory and bottom-up from the settlement level. The implementations of such projects will certainly be more participatory and owned by the local communities (IDD, 2014).

4.4 Planning Perspective of Roads in Nepal

Road planning is carried out for Strategic roads as well as rural roads in Nepal. Besides that, urban road planning is also carried out. Different government bodies have established separately to carry out these road planning.

4.5 Concept of Municipal Transport Master Plan

Municipal Transport Master Plan (MTMP) is one of the recently applied transport planning tools in Nepal. The guideline was prepared and approved by MoFALD in 2013 which was prepared taking other two major guidelines as references or basis which were DTMP guidelines 2012 and Nepal Urban Road Standard (NURS) 2014. According to MTMP guideline, the master plan of municipal roads should be prepared for action after preparing and analyzing Municipality Inventory Map of Road Network (MIM), Indicative Development Potential Map (IDPM), and Perspective Plan of transport service, facilities & linkages and Municipal Transport Perspective Plan (MTPP).

MTMP is the reflection of existing transport infrastructure situation and future potential in relation with the resources and services available in the municipality. MTMP is prepared for five years and should be updated at every five years. MTMP essentially covers the rural, semi urban and urban transport infrastructures, which are funded, supported and implemented by municipalities. It also tentatively covers the existing and potential areas of market centers, tourism, service centers, agriculture and agro-business areas, town development and land use pattern. MTMP includes priorities of roads as Class A road (Main Collector Road), Class B road (Other Collector Road), Class C road (Main Tole Road) and Class D road (Other Road) having new construction, upgrading and maintenance, along with budget required for them.

MTMP preparation strongly advocates meaningful participation of all key stakeholders in the planning process to make MTMP more acceptable and ensure ownership. The preparation process goes through a series of techno-political activities that include consultation workshops and interactive meetings with stakeholders to increase participation of all stakeholders. These activities include municipal level workshop, Municipality Road Coordination Committee (MRCC) meetings and cluster of Ward level workshops for collecting demands of required road, formal/informal meeting, focus group discussions and transit walk. At every stage, careful consideration is given to ensure access and wider participation of representatives from line agencies, major political parties, social leaders, women organizations, Dalit and Janjati coordination committees, differently able people, chamber of commerce, transportation association. The approach is to work towards consensus building (IDD, 2014).

4.6 Municipal Transport Master Plan

Municipal Transport Master Plan (MTMP) is transport planning tools in Nepal. The guideline was prepared and approved by MoFALD in 2013 (now MoFAGA) taking other two major guidelines as references and they were DTMP guidelines 2012 and Nepal Urban Road Standard (NURS) 2014. According to MTMP guideline, the master plan of municipal roads should be prepared for action after preparing and analyzing Municipality Inventory Map of Road Network (MIM), Indicative Development Potential Map (IDPM), and Perspective Plan of transport service, facilities & linkages and Municipal Transport Perspective Plan (MTPP). MTMP is the reflection of existing transport infrastructure situation and future potential in relation with the resources and services available in the municipality. MTMP is prepared for five years and should be updated at every five years. MTMP essentially covers the rural, semi urban and urban transport infrastructures, which are funded, supported and implemented by municipalities. It also tentatively covers the existing and potential areas of market centers, tourism, service centers, agriculture and agro-business areas, town development and land use pattern. MTMP includes priorities of roads as Class A road (Main Collector Road), Class B road (Other Collector Road), Class C road (Main Tole Road) and Class D road (Other Road) having new construction, upgrading and maintenance, along with budget required for them. MTMP preparation strongly advocates meaningful participation of all key stakeholders in the planning process to make MTMP more acceptable and ensure ownership. The preparation process goes through a series of techno-political activities that include consultation workshops and interactive meetings with stakeholders to increase participation of all stakeholders. These activities include municipal level workshop, Municipality Road Coordination Committee (MRCC) meetings and cluster of Ward level workshops for collecting demands of required road, formal/informal meeting, focus group discussions and transit walk. At every stage, careful consideration is given to ensure access and wider participation of representatives from line agencies, major political parties, social leaders, women organizations, Dalit and Janjati coordination committees, differently able people, chamber of commerce, transportation association. The approach is to work towards consensus building (Infrastructure Development Division, 2014).

2.1 . Nepal Urban Roads Standard

Urbanization is a global phenomenon. It reflects the desire of the humankind to live progressively in more comfortable surroundings with better access to the livelihood. It is also measure of the development a country has made. However, this process should be planned and sustainable. The benefits being enjoyed by a section of the community should not be at the cost of the rest.

Nepal is experiencing a phase of rapid urbanization. This has become a major challenge for the urban planners as well as service providers. Planned development of urban roads not only checks the growth of unruly settlements, but also facilitates systematic provision of other services without distorting the city fabric.

An urban road standard is a prerequisite for planned development of urban roads. Although, Nepal Road Standards 1970 (NRS), revised 2013, has some provisions for urban roads, as the Strategic Road Network (SRN) connecting administrative centers and industries to the major trade routes has quite different function, the NRS alone cannot address urban issue. Neither is the issues addressed by Nepal Rural Road Standards 1998, revised 2012, being focused on farm to market and farm to settlement roads.

Both the DUDBC as well as DoLIDAR have recently started to build urban roads. To address the urban issues, both of them are parallelly formulating a set of standards for urban roads. As the oldest road agency DoR has been constructing and maintaining, including urban roads until recently, through its Division Road Offices (DRO). However, so far it has been paying little attention to follow whatever standard it has for urban roads. Following the promulgation of LSGA, 1999, the municipalities too have started to build roads following rather ad-hoc standards: depending on the mayor's view and the availability of budget. With the number of agencies mandated to construct and maintain urban roads, for equitable and sustainable development they need to share the same set of standards and adhere to it (NURS, 2014).

2.2 Building Construction Guideline

Municipality has several activities. Among them, one of the major activities is to approve the building design and drawing which is to be constructed. But unfortunately few municipalities follow the Building Act and Building Regulation but even there are not proper similarities between them while using those act and regulation. As a result, there may be scattered and unmanaged town development in municipalities. Hence, Building Construction Guideline (BCG) is needed to prepare and maintain healthy, managed and sustainable town development process in municipalities achieving balanced and scientific city environment.

BCG consists guidelines about drain and drainage management, covered and open area, Right of Way, Set back line etc. Chapter 3 of BCG describes about the guidelines of construction development of residential and non-residential areas. It gives clear guidelines about parking development, bus terminal, residential and non-residential buildings, government buildings, health and educational sectors, auditorium and community hall, religious and security related

services and public and semipublic place development (DUDBC, 2013; Mishra,2019; Mishra,2022).

2.3 National Land Use Policy

National Land Use Policy (NLUP) 2012 is prepared mainly to show the proper way for optimum utilization and management of limited land in the country. Government implements land related law, planning and programs and solve the problems arising while implementing it. In the context of Nepal, it has been one of the essential bases for the development of country's economy and livelihood of people. Around 33% of total Gross Domestic Production (GDP) is contributed by agriculture in Nepal.

As per finding evidences, land management and administration was started from Lichchabi Regime, though it was effectively started from Shah Regime. King Surendra Shah put various land management related clauses in Muluki Ain in 1853. Furthermore, in modern era, Land Act 1962, Land related clauses in Muluki Ain 1963, Land related Act 1964, Land Administration Act 1967, Malpot Act 1977 and other various directives and guidelines were established.

Around 27% of total land of Nepal is covered by agriculture land. Same as, 39.6% is covered by Forest, 12% is covered by Charan area, 17.2% is covered by snow and rocky area and 2.6% is covered by water bodies. Total land is divided into following area/sector to utilize the land and its resources properly:

- Agriculture sector
- Residential sector
- Business sector
- Industrial sector
- Forest sector
- Public utility sector
- Other sectors as per necessity and requirements (MoLRM, 2012).

2.4 Comprehensive Town Development Plan

Nepal's urbanization process is rapid and imbalance compared to regional context. This trend is concentrated mainly in Kathmandu Valley and other cities of Terai or fertile Valleys. The result is that the large cities are failing to cope with the demand of infrastructure services and job opportunities and are increasingly reeling under the externalities of the haphazard urbanization. Environmental degradation, congestion, urban poverty, squatter settlements, unemployment and lagging provisions of infrastructure services have become increasingly visible phenomenon in these large cities. Hence, much of the economic gains acquired from urbanization have been eroded from its negative externalities. Despite non-agricultural sector being a major contributor to gross domestic product (GDP), urban centers in the country have yet to emerge as the engines of economic growth and contribute to reduction of urban or rural poverty alike.

Despite all these problems, government's responses have been grossly inadequate. The responses tend to be scattered and ad-hoc rather than planned and coordinated. A weak institutional capability has been one of the leading factors in poor performance of the government agencies. Above all, lack of the long-term development perspectives or plans has led to uncoordinated actions of agencies involved in urban development. Therefore the result is poor or limited impact in urban development efforts. Consequently, economic development has not taken place in the desired manner consistent with the pace of population growth (MoFALD, 2016; Mishra and Aithal, 2021).

Keeping in view of this context, the Government of Nepal has already enacted and has been implementing National Urban Policy since 2007. The policy is conspicuous by prioritizing investment to the lagging regions of the country, while fostering development of regional cities and intermediate towns as well. Therefore with an objective of reducing poverty and urban physical facilities, MoFALD is going to invest a huge amount for the preparation of Comprehensive Town Development Plan (CTDP) in municipalities.

The major objectives of CTDP are to set out long term vision and overall goal, objectives and strategies for municipality. It consists the preparation of Land Use Plan, Physical Development Plan, Social, Cultural, Economic, Financial and Institutional Development Plan, Environmental and Risk Sensitive Land Use Plan, Multi Sectorial Investment Plan (MSIP) on the basis of sectorial goal, objectives, output and programs. It also consists the preparation of building bye-laws to regulate development in the town integrating Land Use and road network plan and long-term vision of the town and detail feasibility of different category prioritized sub projects which is chosen by municipalities as per importance and necessity (MoFALD, 2016).

2.5 National Transport Policy

The present average road density in Nepal equals 10.8 km/100 sq.km. These figure beaks down by geographical division to 27 km/100sq. km. in the Terai, 8 km/100 sq.km. in the Hills and 2 km/100 sq.km. in the mountain regions. In term of density per population, this translates as an average across the country of 1208 persons/km with densities of 600 persons/km in the Terai and 1500 persons/km in the hills. These densities are very low in comparison with other countries. In the present situation by expanding the road transportation infrastructure to increase the road networking density of roads, reasonable upgrading of road networking and repairing and maintaining it, complete the under construction roads.

National Transport Policy (NTP) 2001 is to develop a reliable, cost effective, safe facility oriented and sustainable transport system that promotes and sustains the economic, social, cultural and tourism development of Nepal. Among various policies, it emphasizes the following terms for the construction and development of transport infrastructure in central or local level:

- The short term, medium term and long term master plan of the transport infrastructure to be constructed in central level shall be prepared and constructed accordingly.
- The development of transport infrastructure in the local level shall be carried out in accordance with the master plan prepared therefore.
- To develop the transport infrastructure of the urban area in accordance with the master plan prepared for the urban development. The central level shall perform the role of supporter in the work to be done from the local level.
- To manage the organizational structure as to develop the capacity self-reliance for the arrangement of source of investment in the construction, repairing, maintenance and strengthening of the transport infrastructures and operate the same by providing required service.

Section 7 of NTP 2001 describes about the Sector Transport Policy. Under this section, the road system is classified into three major systems where roads inside municipalities are considered as Urban Road System. Under this system, roads within a municipality, excluding those under central road system, are under urban road system. The construction, maintenance and repairing of these roads shall be done by the municipality. Those works shall be conducted by peoples' participation. Moreover, the construction and operation of permanent parking places including pavement within urban area shall be the responsibility of the respective municipalities. The construction, maintenance, repair and operation of bus terminals shall be under the working scope of municipality. Identification, conservation of green belt in the urban area shall be the responsibility of the municipality itself. These works shall have to be done by the municipality in coordination with various authorities of Government of Nepal (DoR, 2001).

2.6 Town Development, City Planning and Building Construction

Town Development, City planning and Building Construction related construction Standards (TDCBCS) is approved and established in 2015 after learning bitter experience of destructive earthquake occurred in 2015. The previous standards and norms are analyzed and revised by experts to prepare more scientific standards and norms.

Section 11, TDCBCS mainly emphasizes about the implementation of Risk Sensitive Land Use Map by the local government agencies under LSGA, 1999 while performing infrastructure development works. Moreover, Section 13 strictly describes about the various fundamental constructions related standards including for planning and construction of urban and semi urban roads in municipalities. The width of main road of any projects should be at least 8 meters width if it is connected with any existing public roads. The radius of turning of any road should be at least 3.5m. Sub-section 13.8 clearly points out that approval of any building construction should be under present laws, rules and regulations and approved MTMP which is approved by concerned municipality (MOFALD, 2015).

2.7 Municipality Road Planning Practice

Planning of projects should be in systematic and prioritized way. The municipality should adopt participatory and bottom of planning approach for planning o any development activities in the municipality as far as possible. Ilam Municipality has prepared strategic plan for Green City Initiative where municipality puts all the sectors including proper transportation and infrastructure sector in planning (Ilam, 2016). But in high numbers of municipalities, municipality roads are planned and constructed either taking standards or norms from DDCs, donor agencies, DoR or other governmental agencies or haphazardly as the technical persons and stakeholders of municipality desire. As a result, many municipal roads are poorly operated, less maintained and inappropriate design. Government of Nepal should prepare and establish proper scientific standards, norms and its associated plan for the development of municipal road networks (MoFALD, 2012).

2.8 Mobility and Safety Plan: Amravati Municipal Cooperation, India

Amaravati Municipal Cooperation, India has planned to develop the post urban planning and smart cities. Municipality has focused in major six key areas and urban transportation is one of the important keys in their plan.

Municipality is going to prepare GPS enabled map of the connectivity occurred in the municipality. If the roads are narrow for the buses and other vehicles, they are widen and constructed as per required design and after construction, kiosks will be kept at every bus stop. The enhancement, usability and ownership of the connectivity is taken by municipality itself.

Bus fleet capacity will be increased and it will be supported by enhancing required infrastructure development. 100% traffic light system will be installed (Amaravai Municipal, 2015).

2.9 Sustainable Urban Transport Plans in Europe

Transport tends to bring about persistent and detrimental impacts, whether it is at local, regional or global level, particularly with regards to environment and health. The influence of urban transport on these trends is significant and technological progress alone is unlikely to solve these problems in the short term.

Urban transport demand is dominated by road transport and needs to be addressed by a joint effort at the local, national and European levels of governance. In addition, local urban authorities can contribute to meeting community objectives on sustainable transport, environment, cohesion and competitiveness. Compliance with air and noise, EU legislations requires that plans addressing urban transport are drawn up in many conurbations.

The size of the challenges faced by the EU in these areas-notably as regards climate change, air quality, ambient noise, congestion and road safety-will require strong support from local authorities responsible for urban transport management and land use planning in order to jointly bring about more sustainable urban transport patterns.

Integrated and holistic solutions are therefore needed to curb these trends. That is why the Commissions, the Council and European Parliament encourage local authorities to view to preventing and reducing environment and health pressure in European conurbations and contribute significantly to community wide policies (European Commission, 2007).

2.10 Implement ability

Municipal Transport Master Plan guideline is prepared based on DTMP guidelines. Both guidelines are prepared for the development of local road networks in local bodies. All 75 districts have already prepared DTMP and most of the districts have implemented it. Many districts have also revised DTMP (DoLIDAR, 2016).

Local institutes faced many problems during preparation and implementation of DTMP. The roads were taken and prioritized from already listed roads in DDCs rather than accumulating demand forms. Prioritization and ranking were carried out mainly based on total population served, market situations corresponding to its total length neglecting other major indicators such as service areas, tourist, cultural and historical aspect, agricultural services and potentialities. In some districts, there were problems of technical manpower scarcity, weak institution and coordination, negative motivation of stakeholders (Khadka, 2016).

MTMP is an outcome of Policy Analysis Stream rather than Political Policy making Stream.

There are many approaches to prepare these types of plan such as Process Approach, Output/Outcome Approach, and Strategic Policy making Approach. System model, Institutional model and Functional process model are the models to carry out the Process Approach. Likewise, Incrementalist model and Rationalist model are the models to carry out Output/Outcome Approach. Furthermore, Entrepreneur model, Adaptive model and Strategic Planning model are the models to carry out Strategic Policy making model (Mainali, 2013).

In Policy Analysis Stream, there are assessment of implementability, performance evaluation, impact and effectiveness and strategic evaluation. Though MTMP has just prepared but still not implemented, there should be assessment of implementability. There are several indicators to analyze whether the policy is implementable or not. Rational, Legitimate, Feasible, Politically viable and socially acceptable are taken as indicators for the assessment of implementation of MTMP (Mainali, 2013; Mishra and Magar, 2017).

6. RESEARCH METHODOLOGY

6.1 Study Area

Devchuli municipality is located in Nawalparasi East district of Gandaki Province in Nepal. The municipality has subtropical to temperate climate. So, it will be very hot in the summer at plain area and moderate cold in the winter at hilly area. The maximum temperature rises up to 39 degree Celsius and falls down as low as 7 degree Celsius. The rainfall is mainly due to the southern-eastern monsoon. The monsoon, generally starts from the mid of June and ends by the mid of October. More than 80% of the annual rainfall takes place between June and September. The average annual rainfall, generally, varies from 1971 mm to 2331.3 mm.

3.2 Approach

Municipality Transport Master Plan has been prepared using participatory bottom-up approach and differs from conventional practices of trickle down approach. Techno-Political interface has been incorporated in the planning process, where active participation from representatives of political parties, line agencies, municipality officials is crucial. The Municipality Road Coordination Committee (MRCC) has been constituted as authorized legislative body of municipality. This body, comprising all political parties' representatives and concerned technical officials, helps in necessary policy decisions during the MTMP preparation and implementation process. Both primary and secondary data were collected. The adopted Methodological flow can be presented with the help of figure 3.

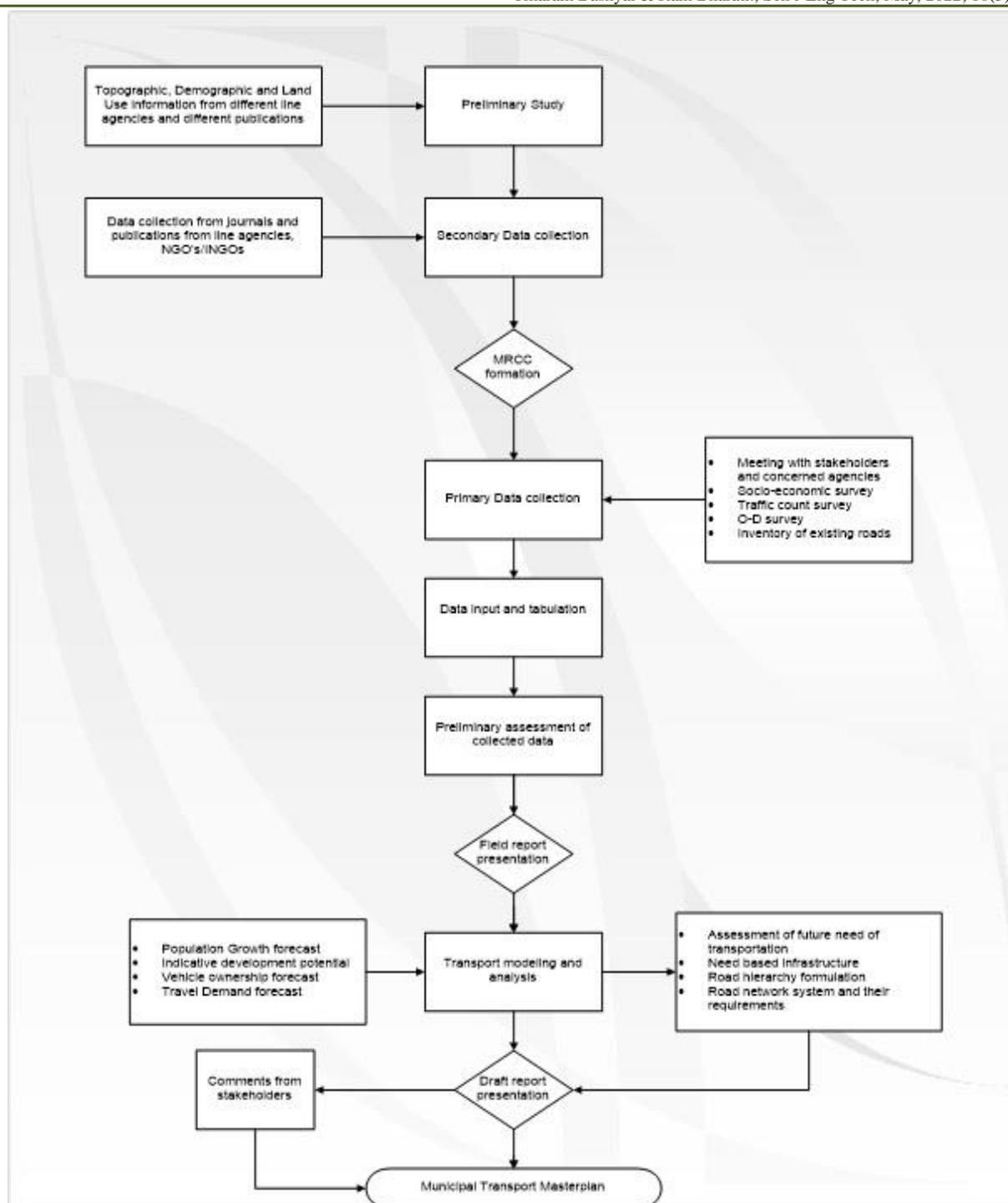


Fig-3.1: Methodological Framework

6.2 Primary Data

Primary data was collected through observation checklist, questionnaire surveys and Key Informant Interview (KII).

6.3 Secondary Data

Secondary data was collected from the literature study of national and international articles, published journals, reports, manuals and internet/websites about the ways to incorporate concept of planning.

6.4 Analysis of Data

Paired t-test was also carried out to test the possible effect of MTMP to the shopkeeper's owners from the formula.

$$t = \frac{d'}{(Sd/\sqrt{n})} \text{ Where, } Sd = \sqrt{\frac{\sum(d-d')^2}{(n-1)}} \quad d' = \frac{\sum d}{n}$$

The results obtained can only be perceived well by the readers if presented properly. Presentation tools such as charts, graphs, maps and reports will be used to present the analysis and results obtained.

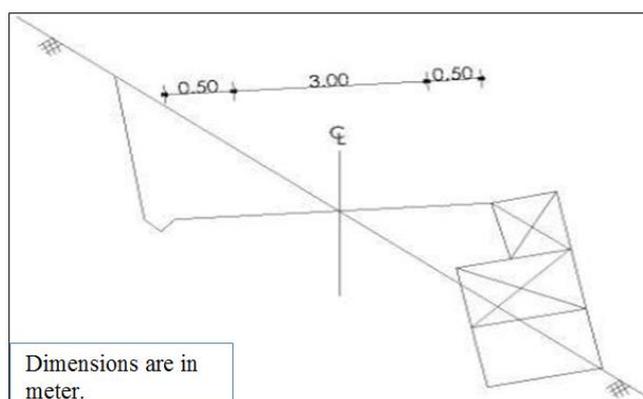
7. RESULTS AND DISCUSSION

7.1. Status of Existing Road Network

The status of existing road network is expressed in terms of Devchuli Municipality Inventory along with its road network linkage to point the development potential map.

Road inventory survey was done and length of the roads collected is about from the sample data it is found that nearly 11% of the daily trips are done via active mode of transport.

From the field measurement, it was found that the overall existing length of this road was 339.67 km (without SRN). At present the road density of about 3.29 km per square km for the municipality. Similarly, the road density per thousand populations is nearly 7.47 km. 33.23 km of the mode of transportation is shared by active road users hence footpath should be proposed on the roads. out of 339.67 km, 101.93 km was found metaled and 124.76 km was graveled and rest was earthen and the width of road was found 4m where in some section, the road width was found up to 4.2m. As shown in given section.



(Devchuli Municipality, 2020)

Fig-4.1: Possible Design of active Road of Devchuli based on DTMP

4.1.1 Compliance of Technical Parameters

The technical parameters of main road were measured with the help of tape and compared with

Nepal Rural Road Standards 2014 (Second Revision)/Village Core Road Network and Nepal Urban Road Standard 2014.

Table-4.1: Compliance of technical parameters as per DTMP (Field Survey, 2021)

S.N.	Design Parameter	Requirement	Examination	Marks
1	Design Capacity-in both directions (Vpd/P.C.U. per day)	100	Yes	1
2	Design Speed (Kmph)	15	Yes	1
3	Right of Way, either side from the road center (m)	7.5	No	0
4	Roadway width (m)	4	Yes	1
5	Carriageway width (m)	3	Yes	1
6	Shoulder width, either side (m)	0.5	Yes	1
7	Minimum safe stopping site (m)	15	Yes	1
8	Minimum radius in horizontal curve (m)	10	No	0
9	Ruling gradient (%)	7	Yes	1
10	Limiting gradient (%)	10	Yes	1
11	Exceptional gradient (%)	12	Yes	1
12	Cross slope in carriageway camber (%)	4	Yes	1
13	Carriageway width at culvert/bridge (m)	4.25	Yes	1
14	Dimensions of Lay-byes/passing zones (mxm)	3x20	No	0
15	Lay byes/passing zone strips at interval of (m)	300	No	0
16	Lateral clearance between roadside object and the edge of the shoulder (m)	Min 0.5	Yes	1
17	Traffic sign and road safety	Needed	No	0
Total				12 (70.59%)

Table 4.1 showed that out of 17 parameters of road design, 12 parameters have been fulfilled. If consider achieving more than 80% means above average standard, 70%-80% means average standard and less than 70% means below average standard

(Jha,2011), then this road falls in average standard village road as per DTMP. This result shows that this road was constructed following the standards of NRRS 2014 but still couldn't achieve all the parameters of VRCN though it should maintain municipality standard.

Table-4.2: Compliance of technical parameters as per MTMP (Field Survey, 2021)

S.N.	Design Parameter	Requirements	Examination	Marks
1	Design Speed (Kmph)	65	N	0
2	Allowable maximum speed (Kmph)	30	N	0
3	Wheelbase of standard vehicle (m)	4.9	N	0
4	Capacity of carriageway; 2 lane 2 way traffic flow (PCU/hr)	1500	N	0
5	Carriageway width in 2 way Multilane	3.5/lane	Y	1
6	Minimum sidewalk (m)(up to 30 pedestrian)	1.5	N	0
7	Minimum Shoulder (m)	As per NRS	N	0
8	Parking lanes (m)	2.5-3	N	0
9	Minimum Bus bays (m)	As per NRS	N	0
10	Minimum Camber (%)	2.5	N	0
11	Minimum Super elevation (%)	As per NRS	N	0
12	Allowable gradient (%)	0.5-4	N	0
13	Maximum Gradient (%)	7	N	0
14	Vertical Clearance (m)	5.5m	N	0
15	Side drain	Tick shaped	N	0
16	Traffic sign and road safety	needed	N	0
Total				1(6.25 %)

Table 4.2 showed that out of 16 parameters of road design, only one parameter has been fulfilled. This road has fallen in below average standard urban road as per NURS. This result shows that this road has just achieve the minimum standards of village road but extremely far from the urban road standards because this road was served as village road to the people until some years ago and suddenly the requirements was changed to achieve an urban road. To meet the

standards of Sadak/Urban Road, the road structures of this main road should be widely improved.

7.2. Effect of MTMP in Financial Development

Small surveys were carried out between agro based small shopkeepers of bazar, The answers of their tentative net monthly income through these small shops were gathered and tabulated to conduct two tailed t-test ($n=10<30$). Paired t-test for small shopkeepers.

Table-4.7: Present and Probable monthly income of Shopkeepers (Field Survey, 2020)

Shopkeepers	1	2	3	4	5	6	7	8	9	10
Present monthly net income (Rs)	8000	10000	10000	9000	12000	12000	9000	9000	9000	10000
Probable monthly net income after MTMP (Rs)	10000	15000	14000	12000	15000	16000	12000	10000	10000	12000

(Note: these present monthly incomes are just a tentative figure said by respondents to interviewee and probable incomes are just assumed expected values given by them to interviewee)

Null hypothesis: $H_0: u_x = u_y$ i.e. there is no significance difference between the net monthly income

before and after implementation of MTMP.

Alternative hypothesis: $H_1: u_x \neq u_y$ (two tailed test) i.e. there is a significant difference between the net monthly income before and after implementation of MTMP.

Table-4.8: Calculation Sheet for Shopkeepers (Field Survey, 2020)

Calculation of d' and S_d					
Shopkeepers	Present monthly net income (x)	Probable monthly net income after MTMP (y)	$d=y-x$	$d-d'$	$(d-d')^2$
1	8000	10000	2000	-800	640000
2	10000	15000	5000	2200	4840000
3	10000	14000	4000	1200	1440000
4	9000	12000	3000	200	40000
5	12000	15000	3000	200	40000
6	12000	16000	4000	1200	1440000
7	9000	12000	3000	200	40000
8	9000	10000	1000	-1800	3240000
9	9000	10000	1000	-1800	3240000
10	10000	12000	2000	-800	640000
Total			28000		15600000

We have,

$$\begin{aligned}d' &= \Sigma d/n \\ &= 28000/10 \\ &= 2800\end{aligned}$$

$$\begin{aligned}S_d &= \sqrt{\Sigma(d-d')^2/(n-1)} \\ &= \sqrt{15600000/9} \\ &= 1316.56\end{aligned}$$

$$\begin{aligned}&= 2800/(1316.56/\sqrt{9}) \\ &= 6.39\end{aligned}$$

Degree of freedom = $n-1=10-1=9$ Level of significance (α)=1%

Critical Value: The tabulated value of t at 1% level of significance for two tailed test and for 9 d.f. is 3.25

DECISION

Since calculated value of t is greater than tabulated value t , the null hypothesis H_0 is rejected. It indicated that the net monthly income of small shopkeepers would be raised after implementation of MTMP.

Similar nature result was obtained in the case of small service provider. The calculated value of ' t ' was found 3.41 where the Critical value was found 3.25. Since, the calculated value of ' t ' was achieved greater than tabulated value of ' t ', the null hypothesis H_0 was rejected. That means, the net monthly income of owners of small service provider would be raised after implementation of MTMP.

8. CONCLUSION AND RECOMMENDATION

8.1 Conclusion

The condition of main road was found unmaintained and upgraded needed. Still more than two third part was found dusty earthen surface, insufficient road structures and high numbers of vehicles are run in the road. Peoples' participation and Bottom up Planning Approach was adopted in the planning process during preparation of MTMP.

The major problems in the road section was found dusty earthen surface, no required side drain and footpath, no required retaining structures, sharp bends and no traffic sign and signals. Municipality is also facing about problems of Bus Park, Right of Way and Setback issues.

MoFALD initiated the concept of MTMP. The major purpose of MTMP is to integrate/tie up the various sectors in well managed municipal road networks. MIM, IDPM, VCDP, MTPP are the major features of MTMP. This road provides various services to the people and have high potentials. Municipality has set visions surrounding it. Various sectorial developments can be achieved after proper implementation of MTMP. It was found that MTMP is

rational due to overloaded traffic vehicles and high potentialities surrounding ring road. The responses and expected developments made MTMP legitimate. Proposed road and its structure, adopted planning process and participation of stakeholder made it feasible. Participation of political persons and beneficiaries in preparation of MTMP and their responses showed politically viable and socially acceptable while assessing implement ability of MTMP.

It was found that various Central agencies, Local agencies, NGOs and INGOs are the funding sources to implement MTMP. But financial situation was found deficit to implement MTMP in road.

8.2 RECOMMENDATION

5.2 Recommendation

- Based on this study, following recommendation are made:
- Municipality should focus on regular and periodic maintenance of road and its structures. Municipality also should focus on upgrade of road as per MTMP.
- Due to incremental traffic flow in main road, municipality should provide traffic sign for safety. Temporary passing zone should be made in the road.
- Municipality should focus about increasing internal revenue and also about getting more budgets from center for smooth implementation. Detail Project Report (DPR) should be made of road to determine the exact requirements of road.
- MTMP is one of the most effective transportation planning tools for municipality. It has many opportunities. Hence, municipality should give MTMP in high priority.
- MTMP report of Devchuli should focus precisely in development of roads with its probable budget scenario for five years based on MTPP in detail.

8.3 Recommendation for Further Study

The present research has been focused on importance of MTMP in the Municipality. There are still several areas which the study does not cover. Benefits taken by tourism sector due to MTMP can be again analyzed in depth. After implementation, the challenges and opportunities of MTMP can be studied. Ward level Transportation Master Plan can be also researched.

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