REPUBLIC OF KENYA

KENYA NATIONAL BUREAU OF STATISTICS

Gross Domestic Product
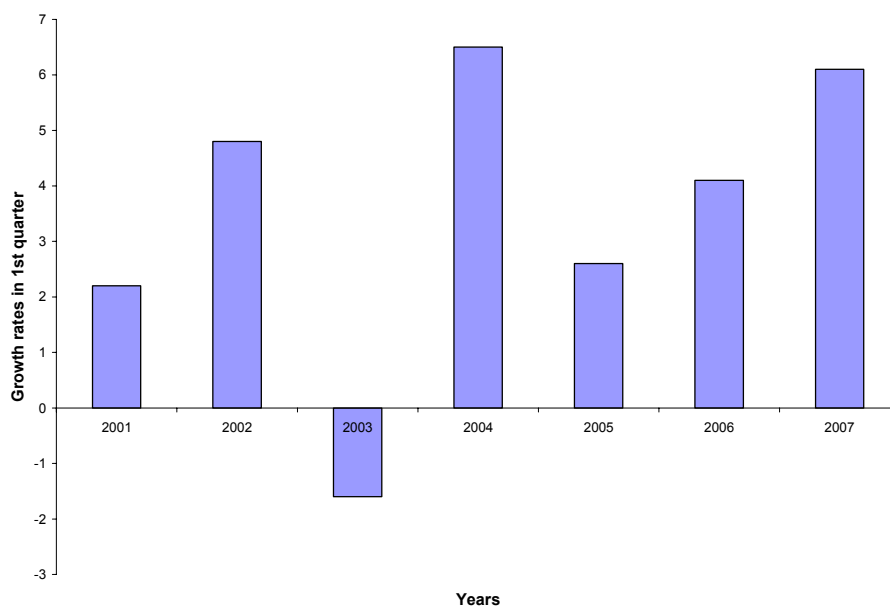## First Quarter 2007

Table of contents

Introduction

This release gives the official Quarterly Gross Domestic Product (QGDP) estimates for Kenya. It provides the first set of results for quarter 1 of 2007. The compilation of QGDP follows the need to have timely policy interventions which can only be achieved if there are timely and frequent reports on recent economic developments. In response to the need for timely information, the Bureau initiated implementation of Quarterly Gross Domestic Product (QGDP) in December 2005 of which details were published in the Economic Survey 2007 and can also be seen in the annex. The aggregates shown have been derived from a wide variety of sources as indicated in table 3 (Annex).

Economic performance

The Real gross domestic product at market prices is estimated to have increased by 6.3 per cent in the first quarter of 2007[1] compared to 4.1 per cent in the first quarter of 2006, from KShs. 292.67 billion to KShs. 310.98 billion as shown in Table 1 and 2 respectively. The agriculture sector, which experienced drought during the first quarter of 2006, recovered to record a growth of 11.5 per cent in 2007 compared to 0.3 percent in 2006. The other sectors that spurred the growth are manufacturing, hotels and restaurants and transport and communication.

Graph 1. Growth rates of the first quarter

---

[1] The percentages quoted measure the changes from the first quarter the previous year.

Sector Analysis

Agriculture

The sector recovered from the drought experienced in the first quarter of the previous year to record a growth of 12.0 per cent in 2007 compared 0.3 per cent in 2006. There was significant growth in the production of major crops except for coffee and sugar cane which recorded declines. Tea production went up by 119.7 per cent from 49,470 metric tonnes in the first quarter of 2006 to record 108, 701 metric tones in 2007. Exports of horticultural produce rose by 0.3 per cent from 44,359 metric tonnes in the first quarter 2006 to 44,501 metric tonnes in the first quarter of 2007 which is attributed to increase in cut flowers and fruits. However the production of coffee declined from 17,606 metric tonnes in 2006 to 16, 573 metric tonnes in 2007. Milk production increased from 75, 575 million litres in 2006 to 108,114 million litres in 2007.

Manufacturing

The manufacturing sector recorded an estimated growth of 7.4 per cent in the first quarter of 2007 compared to 7.1 per cent in 2006. There was a growth of 6.1 per cent in the manufacturing of food, beverages and tobacco while that of all other manufacturing recorded a growth of 8.1 per cent.

Electricity and Water

The sector recorded a growth of 4.9 per cent in the first quarter of 2007 as compared to a decline of 1.4 per cent in 2006.This increase is attributed to higher generation of hydroelectricity as compared to other sources of energy.

Hotels and Restaurants

Hotels and restaurants recorded a growth of 5.8 percent in the first quarter of 2007 compared to 2.3 percent in the first quarter of 2006. This can be attributed to increase in the bed occupancy by 13.9 per cent in the first quarter of 2007.

**Transport and Communication**

The sector recorded a decelerated growth of 6.4 percent in 2007 compared to 15.6 per cent in the first quarter of 2006. The consumption of light fuel went down by 10.6 percent from 245.0 thousand metric tonnes in 2006 to 219 thousand metric tonnes in 2007 while the consumption of motor spirit went up by 2.9 per cent from 79.6 thousand metric tonnes in 2006 to 81.9

thousand metric tonnes in 2007 which are the indicators for road, rail and water transport sub sector. The number of tourist arrivals and departures which monitors the performance of the air transport sub sector went up by 13.0 percent and 11.9 per cent respectively. The communication sub sector recorded a decelerated growth of 9.1 per cent in 2007 from 21.8 per cent in 2006.

Seasonally adjusted GDP

In order to measure changes from one quarter to the following, the estimates need to be seasonally adjusted. This is done only for at the total level, for GDP, and not for the sectors. See explanations in the Annex. The seasonally adjusted GDP decreased with 0.8 per cent from the fourth quarter 2006 to the first quarter 2007. Although this could signal a turning point, the seasonally adjusted series must be treated with caution. Graph 2 below shows the movement of seasonally adjusted and unadjusted QGDP. The seasonal pattern ranges from highest value in the fourth quarter which declines to the lowest point in the second quarter and rises again to peak in the fourth quarter.

Graph 2. The quarterly GDP (original) and the seasonally adjusted GDP (Season).
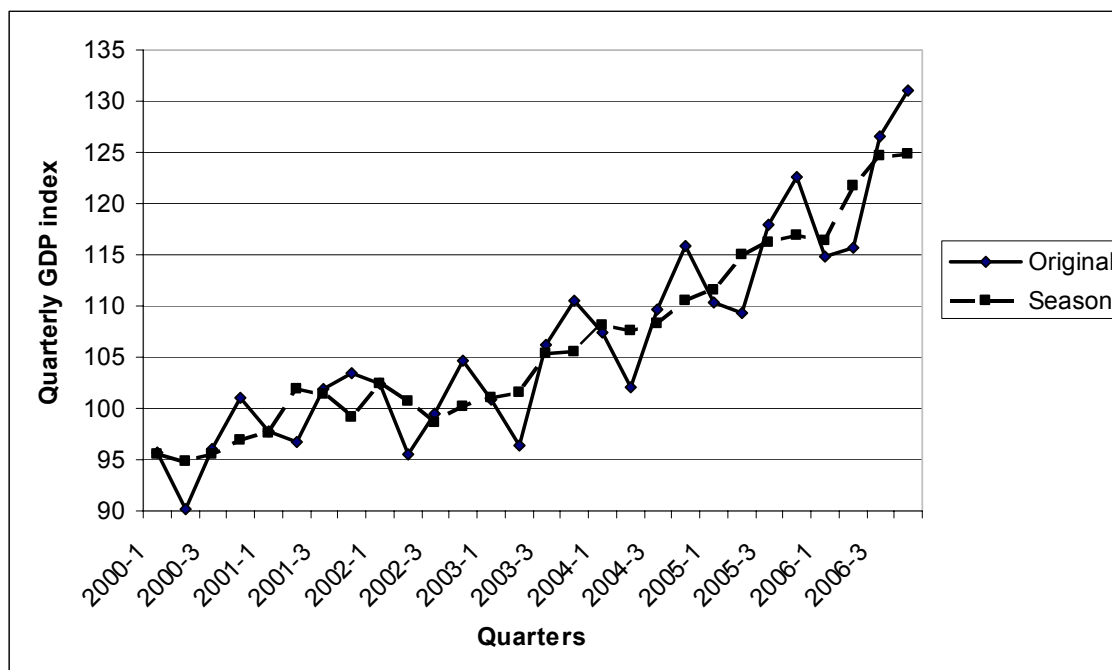
GDP, 1ˢᵗ quarter of 2001 = 100

Table 1: GDP at Constant 2001 Prices, KShs Million

Year	Quar-ter	Agricul-ture and forestry	Fishing	Mining and quarrying	Manufac-turing	Electricty and water	Construc-tion	Whole-sale and retail trade	Hotels and restau-rants	Transport and com-munic-ation	Financial interme-diation
2000		251,171	7,995	4,536	98,202	18,683	30,653	88,479	12,280	81,649	47,114
2001		277,592	6,532	4,915	99,777	19,671	31,829	93,531	11,864	92,932	42,124
2002		269,071	5,119	5,036	99,858	23,749	31,214	91,219	12,425	101,336	41,443
2003		276,089	4,765	5,213	105,822	27,074	31,530	92,604	9,899	104,915	42,064
2004		280,518	5,246	5,195	110,544	27,877	32,932	100,481	13,741	112,251	42,657
2005		299,749	5,751	5,335	115,699	27,898	35,446	106,009	15,572	122,243	43,868
2006		315,805	6,269	5,554	123,626	27,635	37,665	117,524	17,895	135,466	46,265
2000	1	63,498	2,267	1,062	24,831	5,510	7,009	21,538	3,407	18,808	12,087
	2	54,167	1,763	1,176	23,932	5,173	8,127	20,505	2,511	18,748	11,891
	3	64,038	1,688	1,188	24,520	3,918	8,126	21,634	2,826	21,111	11,742
	4	69,469	2,277	1,109	24,919	4,082	7,390	24,802	3,535	22,982	11,394
2001	1	67,652	1,440	1,158	25,512	4,712	7,390	22,495	3,264	21,834	10,894
	2	60,318	1,830	1,301	25,236	4,701	8,927	22,236	2,453	22,956	10,633
	3	73,821	1,645	1,246	24,925	5,123	8,264	22,666	2,739	24,143	10,304
	4	75,801	1,617	1,210	24,104	5,136	7,247	26,134	3,409	23,999	10,293
2002	1	67,968	1,342	1,212	25,217	5,426	7,882	23,032	3,494	25,375	10,312
	2	57,658	985	1,275	24,819	5,999	8,098	21,476	2,618	25,635	10,244
	3	69,628	1,277	1,299	25,191	6,235	7,698	21,818	3,200	23,690	10,431
	4	73,816	1,516	1,250	24,631	6,089	7,536	24,893	3,114	26,636	10,457
2003	1	65,494	1,253	1,282	25,870	6,314	7,813	22,825	2,516	26,386	10,389
	2	58,961	928	1,359	25,975	6,694	8,390	20,969	2,064	23,453	10,349
	3	73,999	1,183	1,284	26,889	6,904	7,758	23,120	2,462	26,950	10,481
	4	77,634	1,401	1,287	27,087	7,162	7,570	25,690	2,857	28,126	10,846
2004	1	70,241	1,337	1,248	27,234	7,198	7,780	24,288	3,518	27,585	10,631
	2	59,048	1,186	1,331	27,026	7,057	8,517	23,270	2,694	26,353	10,606
	3	72,066	1,265	1,373	26,999	6,615	8,945	25,052	3,714	29,086	10,665
	4	79,163	1,458	1,243	29,284	7,007	7,690	27,871	3,816	29,227	10,754
2005	1	69,668	1,612	1,284	27,799	6,943	8,312	23,879	5,100	29,161	10,831
	2	64,156	1,054	1,283	28,822	6,905	8,535	25,166	3,030	29,411	10,867
	3	80,709	1,429	1,433	28,707	7,010	9,612	26,591	3,852	32,019	10,992
	4	85,217	1,655	1,335	30,370	7,040	8,986	30,373	3,589	31,652	11,179
2006	1	69,864	1,661	1,297	29,765	6,844	8,960	24,826	5,218	33,701	11,297
	2	67,658	1,107	1,335	30,248	6,859	8,910	29,841	3,388	32,809	11,552
	3	86,986	1,520	1,441	31,368	6,895	9,742	30,019	4,802	34,922	11,568
	4	91,297	1,981	1,481	32,245	7,037	10,053	32,838	4,487	34,033	11,849
2007	1	78,271	1,686	1,336	31,979	7,181	8,912	25,891	5,522	35,865	12,125

Table 1 GDP at Constant Prices, KShs Million (continued)

Year	Quar-ter	Real estate, renting, business services	Public admi-nistration	Education	Other services	FISIM	All industries at basic prices	All industries excl. agri-culture	Taxes on products	GDP at market prices	GDP, seaso-nally adjusted
2000		57,091	48,243	62,148	67,339	-12,479	863,105	611,933	113,232	976,337	
2001		58,667	46,760	63,013	69,424	-11,772	906,859	629,267	113,148	1,020,007	
2002		60,452	46,731	64,748	71,453	-10,665	913,190	644,119	112,394	1,025,584	
2003		61,864	46,991	71,045	72,203	-10,315	941,763	665,674	113,895	1,055,658	
2004		63,740	47,062	72,268	74,854	-10,801	978,565	698,047	130,772	1,109,338	
2005		65,882	46,461	72,908	77,136	-11,261	1,028,696	728,947	144,088	1,172,784	
2006		68,402	45,631	73,549	80,091	-11,989	1,089,386	773,580	155,059	1,244,445	
2000	1	14,309	12,105	15,593	16,738	-3,152	215,611	152,113	28,441	244,052	243,430
	2	14,158	12,120	15,560	16,777	-3,117	203,494	149,327	26,427	229,921	242,026
	3	14,199	12,068	15,521	16,854	-3,122	216,312	152,274	28,467	244,779	243,697
	4	14,426	11,949	15,474	16,970	-3,089	227,688	158,220	29,897	257,585	246,909
2001	1	14,486	11,798	15,785	17,124	-3,032	222,513	154,862	26,971	249,485	248,880
	2	15,119	11,676	15,690	17,279	-3,001	217,352	157,034	29,377	246,730	259,939
	3	14,731	11,629	15,706	17,433	-2,894	231,482	157,661	28,506	259,988	258,558
	4	14,331	11,657	15,833	17,588	-2,846	235,511	159,711	28,293	263,805	252,726
2002	1	15,581	11,679	16,048	17,742	-2,756	229,554	161,585	31,784	261,337	261,146
	2	14,663	11,672	16,085	17,853	-2,654	216,425	158,767	27,252	243,677	256,814
	3	14,961	11,679	16,205	17,918	-2,649	228,582	158,953	24,921	253,502	251,648
	4	15,247	11,701	16,410	17,940	-2,607	238,630	164,814	28,438	267,068	255,660
2003	1	15,673	11,733	17,723	17,939	-2,555	230,655	165,160	26,529	257,183	257,725
	2	15,418	11,752	17,776	17,975	-2,521	219,542	160,581	26,201	245,743	259,003
	3	15,256	11,757	17,788	18,069	-2,557	241,342	167,343	29,643	270,985	268,440
	4	15,517	11,749	17,759	18,220	-2,682	250,224	172,590	31,522	281,746	269,239
2004	1	16,056	11,743	18,098	18,462	-2,652	242,766	172,526	31,217	273,983	275,819
	2	16,087	11,767	18,026	18,648	-2,677	228,940	169,892	31,442	260,382	274,369
	3	15,555	11,777	18,031	18,806	-2,717	247,232	175,166	32,467	279,699	276,246
	4	16,042	11,775	18,114	18,937	-2,754	259,627	180,464	35,647	295,274	281,902
2005	1	16,310	11,661	18,131	19,040	-2,776	246,956	177,288	34,261	281,217	284,256
	2	16,772	11,621	18,173	19,179	-2,785	242,190	178,035	36,394	278,584	293,422
	3	16,512	11,612	18,248	19,353	-2,822	265,258	184,549	35,261	300,519	296,165
	4	16,288	11,566	18,356	19,563	-2,879	274,292	189,076	38,172	312,464	297,932
2006	1	16,905	11,483	18,225	19,808	-2,914	256,940	187,076	35,734	292,673	296,974
	2	16,765	11,420	18,345	19,992	-2,993	257,236	189,577	37,635	294,871	310,314
	3	16,860	11,376	18,447	20,115	-2,997	283,063	196,076	39,789	322,852	317,766
	4	17,872	11,352	18,532	20,176	-3,085	292,148	200,851	41,901	334,049	318,415
2007	1	17,174	11,677	18,566	20,329	-3,168	272,979	195,076	37,630	310,978	315,849

Table 2 GDP at Constant Prices, Changes in Per Cent

Year	Quar-ter	Agricul-ture and forestry	Fishing	Mining and quarrying	Manufac-turing	Electricty and water	Construc-tion	Whole-sale and retail trade	Hotels and restau-rants	Transport and com-munic-ation	Financial interme-diation
2000											
2001		10.5	-18.3	8.4	1.6	5.3	3.8	5.7	-3.4	13.8	-10.6
2002		-3.1	-21.6	2.5	0.1	20.7	-1.9	-2.5	4.7	9.0	-1.6
2003		2.6	-6.9	3.5	6.0	14.0	1.0	1.5	-20.3	3.5	1.5
2004		1.6	10.1	-0.4	4.5	3.0	4.4	8.5	38.8	7.0	1.4
2005		6.9	9.6	2.7	4.7	0.1	7.6	5.5	13.3	8.9	2.8
2006		5.4	9.0	4.1	6.9	-0.9	6.3	10.9	14.9	10.8	5.5
2000	1										
	2										
	3										
	4										
2001	1	6.5	-36.5	9.0	2.7	-14.5	5.4	4.4	-4.2	16.1	-9.9
	2	11.4	3.8	10.6	5.4	-9.1	9.8	8.4	-2.3	22.4	-10.6
	3	15.3	-2.5	4.9	1.7	30.8	1.7	4.8	-3.1	14.4	-12.2
	4	9.1	-29.0	9.1	-3.3	25.8	-1.9	5.4	-3.6	4.4	-9.7
2002	1	0.5	-6.8	4.6	-1.2	15.2	6.7	2.4	7.0	16.2	-5.3
	2	-4.4	-46.2	-2.0	-1.7	27.6	-9.3	-3.4	6.7	11.7	-3.7
	3	-5.7	-22.4	4.2	1.1	21.7	-6.9	-3.7	16.8	-1.9	1.2
	4	-2.6	-6.2	3.3	2.2	18.6	4.0	-4.7	-8.6	11.0	1.6
2003	1	-3.6	-6.6	5.8	2.6	16.4	-0.9	-0.9	-28.0	4.0	0.7
	2	2.3	-5.8	6.6	4.7	11.6	3.6	-2.4	-21.1	-8.5	1.0
	3	6.3	-7.4	-1.1	6.7	10.7	0.8	6.0	-23.1	13.8	0.5
	4	5.2	-7.6	2.9	10.0	17.6	0.4	3.2	-8.3	5.6	3.7
2004	1	7.2	6.7	-2.7	5.3	14.0	-0.4	6.4	39.8	4.5	2.3
	2	0.1	27.8	-2.1	4.0	5.4	1.5	11.0	30.5	12.4	2.5
	3	-2.6	7.0	6.9	0.4	-4.2	15.3	8.4	50.9	7.9	1.8
	4	2.0	4.1	-3.5	8.1	-2.2	1.6	8.5	33.6	3.9	-0.8
2005	1	-0.8	20.6	2.9	2.1	-3.6	6.8	-1.7	45.0	5.7	1.9
	2	8.6	-11.1	-3.6	6.6	-2.1	0.2	8.1	12.5	11.6	2.5
	3	12.0	13.0	4.4	6.3	6.0	7.5	6.1	3.7	10.1	3.1
	4	7.6	13.5	7.4	3.7	0.5	16.9	9.0	-5.9	8.3	4.0
2006	1	0.3	3.0	1.0	7.1	-1.4	7.8	4.0	2.3	15.6	4.3
	2	5.5	5.0	4.0	4.9	-0.7	4.4	18.6	11.8	11.6	6.3
	3	7.8	6.4	0.6	9.3	-1.6	1.4	12.9	24.6	9.1	5.2
	4	7.1	19.7	11.0	6.2	0.0	11.9	8.1	25.0	7.5	6.0
2007	1	12.0	1.5	3.0	7.4	4.9	-0.5	4.3	5.8	6.4	7.3

NB:
The change is measured against the same quarter the previous year.

Table 2: GDP at Constant Prices, Changes in Per Cent (continued)

Year	Quar-ter	Real estate, renting, business services	Public admi-nistration	Education	Other services	FISIM	All industries at basic prices	All industries excl. agri-culture	Taxes on products	GDP at market prices	GDP, seaso-nally adjusted
2000											
2001		2.8	-3.1	1.4	3.1	-5.7	5.1	2.8	-0.1	4.5	
2002		3.0	-0.1	2.8	2.9	-9.4	0.7	2.4	-0.7	0.5	
2003		2.3	0.6	9.7	1.0	-3.3	3.1	3.3	1.3	2.9	
2004		3.0	0.2	1.7	3.7	4.7	3.9	4.9	14.8	5.1	
2005		3.4	-1.3	0.9	3.0	4.3	5.1	4.4	10.2	5.7	
2006		3.8	-1.8	0.9	3.8	6.5	5.9	6.1	7.6	6.1	
2000	1										
	2										-0.6
	3										0.7
	4										1.3
2001	1	1.2	-2.5	1.2	2.3	-3.8	3.2	1.8	-5.2	2.2	0.8
	2	6.8	-3.7	0.8	3.0	-3.7	6.8	5.2	11.2	7.3	4.4
	3	3.7	-3.6	1.2	3.4	-7.3	7.0	3.5	0.1	6.2	-0.5
	4	-0.7	-2.4	2.3	3.6	-7.9	3.4	0.9	-5.4	2.4	-2.3
2002	1	7.6	-1.0	1.7	3.6	-9.1	3.2	4.3	17.8	4.8	3.3
	2	-3.0	0.0	2.5	3.3	-11.6	-0.4	1.1	-7.2	-1.2	-1.7
	3	1.6	0.4	3.2	2.8	-8.5	-1.3	0.8	-12.6	-2.5	-2.0
	4	6.4	0.4	3.6	2.0	-8.4	1.3	3.2	0.5	1.2	1.6
2003	1	0.6	0.5	10.4	1.1	-7.3	0.5	2.2	-16.5	-1.6	0.8
	2	5.2	0.7	10.5	0.7	-5.0	1.4	1.1	-3.9	0.8	0.5
	3	2.0	0.7	9.8	0.8	-3.5	5.6	5.3	18.9	6.9	3.6
	4	1.8	0.4	8.2	1.6	2.9	4.9	4.7	10.8	5.5	0.3
2004	1	2.4	0.1	2.1	2.9	3.8	5.3	4.5	17.7	6.5	2.5
	2	4.3	0.1	1.4	3.7	6.2	4.3	5.8	20.0	6.0	-0.5
	3	2.0	0.2	1.4	4.1	6.3	2.4	4.7	9.5	3.2	0.7
	4	3.4	0.2	2.0	3.9	2.7	3.8	4.6	13.1	4.8	2.0
2005	1	1.6	-0.7	0.2	3.1	4.7	1.7	2.8	9.8	2.6	0.9
	2	4.3	-1.2	0.8	2.8	4.0	5.8	4.8	15.7	7.0	3.2
	3	6.2	-1.4	1.2	2.9	3.9	7.3	5.4	8.6	7.4	0.9
	4	1.5	-1.8	1.3	3.3	4.5	5.6	4.8	7.1	5.8	0.6
2006	1	3.7	-1.5	0.5	4.0	5.0	4.0	5.5	4.3	4.1	-0.3
	2	0.0	-1.7	0.9	4.2	7.5	6.2	6.5	3.4	5.8	4.5
	3	2.1	-2.0	1.1	3.9	6.2	6.7	6.2	12.8	7.4	2.4
	4	9.7	-1.9	1.0	3.1	7.2	6.5	6.2	9.8	6.9	0.2
2007	1	1.6	1.7	1.9	2.6	8.7	6.4	4.3	5.3	6.3	-0.8

NB:

The change is measured against the same quarter the previous year. However, the seasonally adjusted series measures the change from the previous quarter.

9

ANNEX

Concepts, definitions and role of QNA

Quarterly National Accounts (QNA) is an integrated and consistent system of macroeconomic accounts designed to describe the entire system of production on a quarterly basis. It provides a picture of current economic developments that is more timely and frequent than provided by Annual National Accounts (ANA) and more comprehensive than that provided by individual short-term indicators. Therefore, the key attributes of QNA are timeliness, coherence, comprehensiveness and of reasonable level of details in order to serve as a framework for assessing, analyzing, and monitoring current economic developments.

QNA adopts the same concepts, definitions and structure as ANA. In principle QNA covers the entire sequence of accounts and balance sheets as reflected in the *1993 SNA*. However, it is usually less complete than ANA because of constraints relating to time, resources and data availability.

Specifically, QNA provides useful information for:

- Early identification of changes in trend;
- Timely implementation of economic policies;
- Better forecasts, including early estimates of annual accounts;
- Framework for business cycle analysis.

Scope of coverage

The *basic requirement* in compilation of QNA is to publish the following on a quarterly basis with a maximum time lag of 90 days:

- QGDP by activity at current and constant prices;
- Expenditure on QGDP;
- National Income and Saving;

The next level of compilation (advance level) includes the following:

- Full sequence of accounts;
- Balance sheet;
- Output, intermediate consumption and value added by groups of industries;
- Seasonally adjusted data in addition to the original data.

The level of compilation adopted by any country is usually determined by availability of resources and data.

Conceptual links between Quarterly and Annual Accounts

Principally, the only difference between QNA and ANA is the reference period (three months for QNA and twelve months for ANA). The two are also based on the same concepts and definitions (*1993 SNA*). However, quarterly data provide explicit information about short-term movements in the series while annual data determine the overall level and long-term movements.

It is imperative that QNA are consistent with ANA, to avoid confusion about the interpretations of economic development. This means that the sum of the estimates for the four quarters should be equal to the annual estimates. In most cases, the ANA and QNA estimates are based on different data sources. Therefore, the condition above is unlikely to hold. To circumvent this problem, the QNA data is aligned with the annual data through a process known as "benchmarking". Benchmarking process increases the accuracy of quarterly time series by incorporating the usually more accurate annual information into the quarterly estimates.

The general objective of benchmarking is to preserve as much as possible the short-term movements in the source data under the restrictions provided by the annual data and, at the same time, ensure that the sum of the four quarters of the current year is as close as possible to the unknown future annual data. Therefore, the core problem of benchmarking in a quarterly context is how to align quarterly time series to annual data while maintaining the quarterly pattern and without creating a discontinuity in the growth rate from the last quarter of one year to the first quarter of the next year.

Special Problems in Compilation of QNA

Problems associated with compilation of QNA arise from three main sources:

- The fact that QNA compilation relies on incomplete information;
- The estimation process is built on assumptions of varying validity; and
- Some production cycles are longer than three months.

Timing errors: The main consideration in the compilation of QNA is *timeliness* and availability of monthly or quarterly data. Normally, there are less quarterly data available and, given the need to produce quarterly accounts with the least delay possible, initial quarterly

estimates tend to be affected by delays in the collection and processing of the basic data than annual estimates. This contributes to the problem of *timing errors*.

Indicator bias: The most usual method of compiling quarterly accounts is the indicator method, where a set of indicators are used to represent the National Accounts variables. However, the common feature of such indicators is that their coverage is less complete than for the annual data. This means that some indicators may suffer from bias in comparison to the more comprehensive data. Bias may also arise when an indicator is used as a proxy for the target variable but the relationship between the proxy and the target variable are weak.

Long production cycles: Construction, manufacturing (of some heavy equipment) and agricultural activities characteristically have production cycles that exceed three months and this poses a challenge to quarterly compilation. National accounting principles require that production is recorded and valued when it takes place and not simply when a finished product is sold. As a result, production taking place in each quarter must be valued even if the finished product may not be complete. The production should be recorded as work-in-progress and should form part of changes in inventories.

The methodology that has been adopted in Kenya is presented in the next section where the challenges stated above and all the theoretical aspects of QNA have been taken into consideration to the extent possible in QGDP estimations.

Data sources

Quarterly estimations are based on administrative data (Kenya Revenue Authority KRA, Central Bank of Kenya (CBK) and line Ministries) and sample surveys as shown in table 3 below. KNBS usually conduct two monthly surveys, namely the Monthly Survey of Industrial Production (MSIP) and the Survey of Hotels that provide some of the indicators used in estimations.

VAT data (Domestic VAT) from KRA was extensively made use of to estimate activities of industries where regular surveys did not exist. The VAT data provide estimates of turnover by economic activity.

Compilation procedures

As reflected earlier in the Chapter, compilation of QNA includes production of QGDP both at current and constant prices, Expenditure on GDP, National Income and Saving and, the entire sequence of accounts up to balance sheet. However, due to resource constraints and scarcity of short-term indicators, only Quarterly Value Added (QVA) by activity at constant prices is compiled using the production approach.

The calculation of value added using the production approach is ideally derived as output at basic prices less intermediate consumption. But most of the indicators available are on output; therefore, the estimates of quarterly value added by industry are compiled by extrapolating value added with the relevant indicators. The underlying assumption employed is that the ratio of intermediate consumption to output is constant. QGDP at constant prices is finally derived as sum of values added at basic prices plus taxes less subsidies on products.

Indicators are used to track changes over time. These are series of numbers which are presented as index numbers in the estimation process. Index numbers are necessary when weighting indicators (in cases where two or more indicators are used for a given industry). Import values, salaries and sales data are deflated using appropriate price indexes before generating the indices.

Measurement of crop output on a quarterly basis, however, presents special difficulties. Crop harvests are largely confined to a single quarter of the year though the production process occurs on a continuous basis throughout the year. The 1993 SNA recommends that crop output should be distributed among quarters in proportion to the costs incurred in each quarter and that the value added calculated for quarters when there is no harvest should be recorded as work in progress. It was not possible to adopt this recommendation due to data issues and uncertainties associated with calculation of agricultural work-in-progress. Therefore, output of crops and horticulture are recorded at the time of harvest (Harvest Approach). Monthly data exist for industrial crops. For cereals, harvest patterns are used for quarterly allocation. Forecasts from the Ministry of Agriculture are used to estimate the quarters of the current year. Synthetic values and forecasts are used for *other food crops*, which in many cases are grown and harvested continuously over the year. List of indicators and data sources by activities are presented in Table 3.

Table 3: List of indicators and data sources by activity

ISIC[1]	Activity	Indicator	Data source
A011	Growing of crops	-Tea production -Coffee production -Sugarcane production -Cut-flower exports -Vegetable exports -Fruit exports -Population increase for Private consumption of vegetables & fruits -Maize and other cereals (based on crop forecasts)	-Coffee Board of Kenya -Tea Board of Kenya -Ministry of agriculture
A012	Farming of animals	-Synthetic	
A014	Agricultural service activities	-Synthetic	
A02	Forestry	-Synthetic	
B	Fishing	-Quantity of Catches from L. Victoria	-Fisheries Department
C	Mining and Quarrying	-Quantity of soda ash	-Magadi soda
Da	Manufacture of food, beverages & tobacco	-Processed milk production -Maize-meal production -Wheat flour production -Domestic sugar production -Coffee production -Beer production -Soft drinks production -Cigarettes production	-Monthly Survey of Industrial Production (MSIP)
Db	Other manufacturing activities	-Crude petroleum -Laundry soap -Toilet soap -Motor vehicle tyres (number) -Cement production -Galvanized sheets -Assembled motor vehicles (number) -Value of sales for clothing and footwear -Population increase for informal manufacturing activities	-Monthly Survey of Industrial Production (MSIP) -VAT data from KRA
E40	Electricity supply	-Electricity consumed (sales) -Quantity of electricity generated hydro, thermal and geo-thermal process	-Ken-Gen -KPLC
E41	Water supply	-Synthetic	
F	Construction	-Cement consumption	-Monthly survey
G	Wholesale & retail trade; repairs	-Turn-over sales	-VAT data from KRA
H	Hotels & restaurants	-Number of bed-nights by categories (Nairobi high class, Coastal beaches and the rest)	-Monthly survey of Hotels
I60-I63	Transportation & storage	-Consumption of light diesel -Consumption of motor spirit -Tourist arrival -Population increase	-Monthly survey -KPC
I64	Communication	-Value of sales	-VAT data and air time tax

ISIC[1]	Activity	Indicator	Data source
			from KRA
J65	Financial intermediation excl. insurance	-Total domestic credit -Total loans and deposits	-CBK
J66	Insurance & auxiliary financial activities	-Synthetic	
K70	Real estate	-Synthetic	
K71	Renting & business services	-Value of sales	VAT data from KRA
L	Public administration	- Employment numbers	-DPM-IPPD
M	Education	-Primary school enrolment -Secondary school enrolment -University enrolment -Enrolment in Teachers Training Colleges	-Ministry of Education
N	Health & social work	-Synthetic	
OP	Other services	-Synthetic	
	FISIM	-Financial intermediation index	CBK
	Taxes on products	-Import values -Beer production -Production of soft drinks -Cigarettes production -Wholesale & Retail trade Value Added - Hotels & Restaurants Value Added	-Trade data from KRA -Monthly Survey of Industrial Production (MSIP) -

[1]*ISIC-International Standard of Industrial Classification*

National Accounts compilation requires that the whole economy be covered. This means that all data gaps must be filled either explicitly or implicitly. Synthetic quarterly values have been used for economic activities where no indicators are available. Synthetic quarterization of annual values has been done using mathematical techniques (the Bench programme or the Lisman-Sandee formula). Synthetic quarterly values are used for parts of Growing of crops; Farming of animals; Forestry; Water supply; part of Communication (postal and courier services) and; the rest of service sectors.

Benchmarking and seasonal adjustment techniques

As has been highlighted above, the approach and data sources used in the compilation of quarterly and annual GDP are not the same hence the sum of four quarters does not add up to the annual estimates. QGDP estimates, therefore, are re-aligned to annual estimates through benchmarking. Annual GDP estimates are considered to be more reliable as they are based on a more comprehensive data. The proportional Denton method is used to execute the benchmarking process. This is done through quadratic minimization of the differences between the re-aligned and original series, subject to the constraint that the yearly totals of the re-aligned estimates are equal to the annual estimates.

Quarterly estimates quite often show short-term variations due to factors such as weather, habits and legislation, usually defined as seasonal fluctuations. Although seasonality is an integral part of quarterly data, it is often an impediment to correct identification and analysis of the business cycle and trend. Therefore, quarterly estimates are seasonally adjusted as an addition to the raw estimates. Without seasonal adjustment, changes in trend can only be judged by comparing the level of change in the latest quarter with the same of the previous year. Seasonal diagnosis of value added by activity indicated that fluctuations in Agriculture, Hotels and Restaurants and, Wholesale and Retail Trade are the main sources of seasonal variations noted in QGDP. The cyclic pattern ranges from highest value in the fourth quarter which declines to the lowest point in the second quarter and rises again to peak in the fourth quarter. For agriculture, the harvest pattern of crops is the main cause of variation considering that the harvest approach method has been adopted in recording of output. The benchmarked series are seasonally adjusted using the Census X-11/X-12 method.