The Accuracy Improvement of Spatial Data for Land Parcel and Buildings Taxation Objects by Using The Large Scale Ortho Image Data (Case study of Setra Duta residential housing)

TS 1E Cadastral Information Management:

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Background

Land and Buildings taxation is an objective tax.

Need a centainty of parcel position and area measured

The updated data collection is very often not giving a real condition in the field.

The use ortho image product (Quickbird) for hilly area

This research is to develop a reliable data to be taxed for the hilly and mountaineous area by using the quickbird ortho images

Problems

- The difficulties in data acquisition of potential parcel object to be taxed for hilly and mountaineous region and mostly in outskirt area .
- One of difficulties is to determine a real parcel area of object to be taxed, and some survey measurement constrains like the accessibilities, and the irregularity of updating data survey by the taxation office
- How to reduce some geometrical errors of land parcel data by using the ortho image product?.
- To evaluate the use of orthoimage product for the base map information of the land parcel data on the hilly and mountaineaous region.

Aims

To evaluate the accuracy of Quickbird otho image in giving information of parcel area & position of object to be taxed in the hilly & mountaineous region, and also can be a basemap for updating the taxation data.

Scope of research

Evaluation of geometric accuracy of quickbird ortho image and analysis of image map result from Quickbird orthoproduct for taxation purposes.

RESEARCH QUESTIONS

- Is the orthoproduct image result from orthorectification contain better geometric errors compare to image rectification only?.
- Is the quickbird orthoimage able to certify information concerning the parcel area and also for the land parcel data base ?

Advantage

Improving the accuracy of the land parcel identified data by using quickbird ortho image for taxation office.

Able to certify the quality of land parcel data for object to be taxed.

Able to establish digital image map of land parcel data to show the real condition of object to be taxed for the field survey.

METHODS

- Field data measurement for GCP & ICP by using GPS
- Image rectiification
- Image orthorectification
- Image on screen digitation

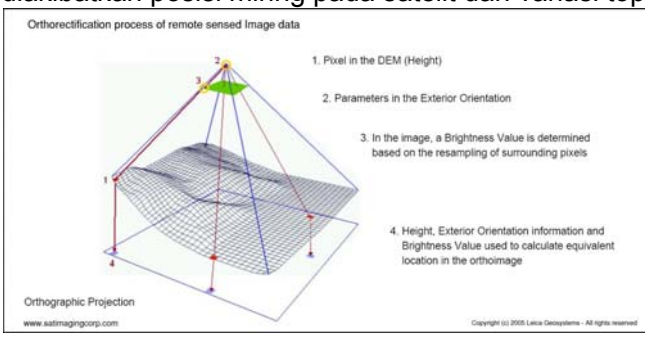
RECTIFICATION

Rektifikasi merupakan proses yang dilakukan untuk memproyeksikan citra ke bidang datar dengan sistem proyeksi peta yang digunakan dan mempunyai orientasi arah yang benar. Pada proses rektifikasi, hal utama yang dilakukan adalah merelokasi setiap pixel dalam suatu citra input (x',y') pada posisi tertentu di citra output (x,y) yang telah terkoreksi dengan melakukan transformasi koordinat (Saputra, 2005).

No	Model Matematik	Jumlah Parameter	Jumlah GCP Minimum
1.	Helmert	4	2
2.	Affine (Polinomial orde 1)	6	3
3.	Polinomial orde 2	12	6
4.	Polinomial orde 3	20	10
5.	Polinomial orde 4	30	15
6.	Polinomial orde 5	42	21

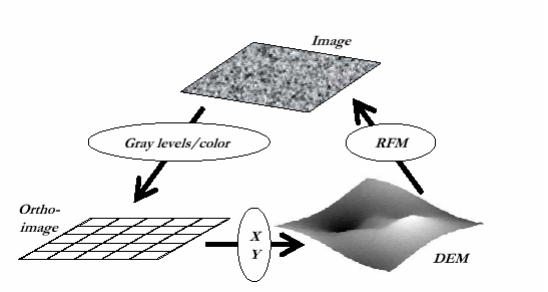
ORTHORECTIFICATION

- Orthorektifikasi adalah proses memposisikan kembali citra sesuai lokasi sebenarnya, dikarenakan pada saat pengambilan data terjadi pergeseran (*displacement*) yang diakibatkan posisi miring pada satelit dan variasi topografi.

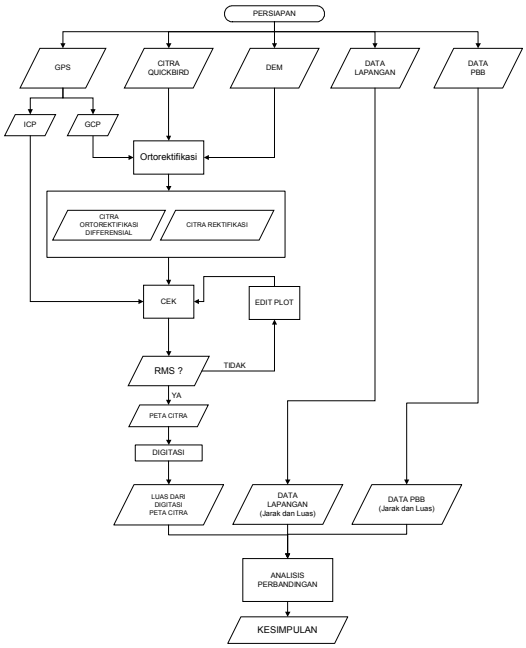


- Pada prinsipnya, orthorektifikasi sama dengan rektifikasi. Hanya saja metode ini digunakan untuk daerah yang mempunyai tekstur ketinggian bervariatif, dan dalam pemrosesannya dibutuhkan data DEM(*Digital Elevation Model*) yang mempunyai interval *grid spacing* yang makin kecil dan ketelitian vertikal yang makin besar.

- Proses orthorektifikasi citra QuickBird dengan menggunakan RFM pada dasarnya identik dengan proses yang dihasilkan model sensor fisik. Orthorektifikasi dilakukan dengan tiga langkah proses : pertama, luas dari citra orthorektifikasi dan resolusinya ditentukan oleh pengguna, kemudian untuk setiap piksel citra-ortho (X,Y), nilai Z yang cocok diinterpolasikan dari DEM, dan titik 3D (X,Y,Z) ditransformasikan kepada ruang citra berdasarkan koefisien RFM. Proses akhir , derajat keabuan (*gray* level) dari titik *3D* yang ditransformasikan, ditentukan oleh interpolasi derajat keabuan dalam ruang citra, dan nilai yang terinterpolasi di kembalikan pada citra ortho.



FLOW DIAGRAM

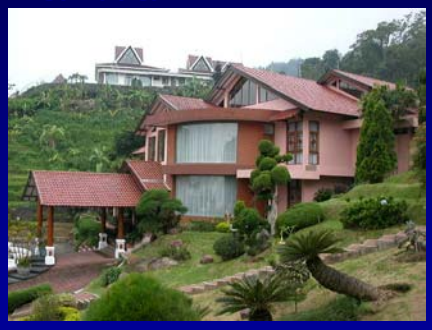


Researh location

Located at West Bandung region where the topographic condition hilly and montaineous (Setraduta housing complex)

Image data

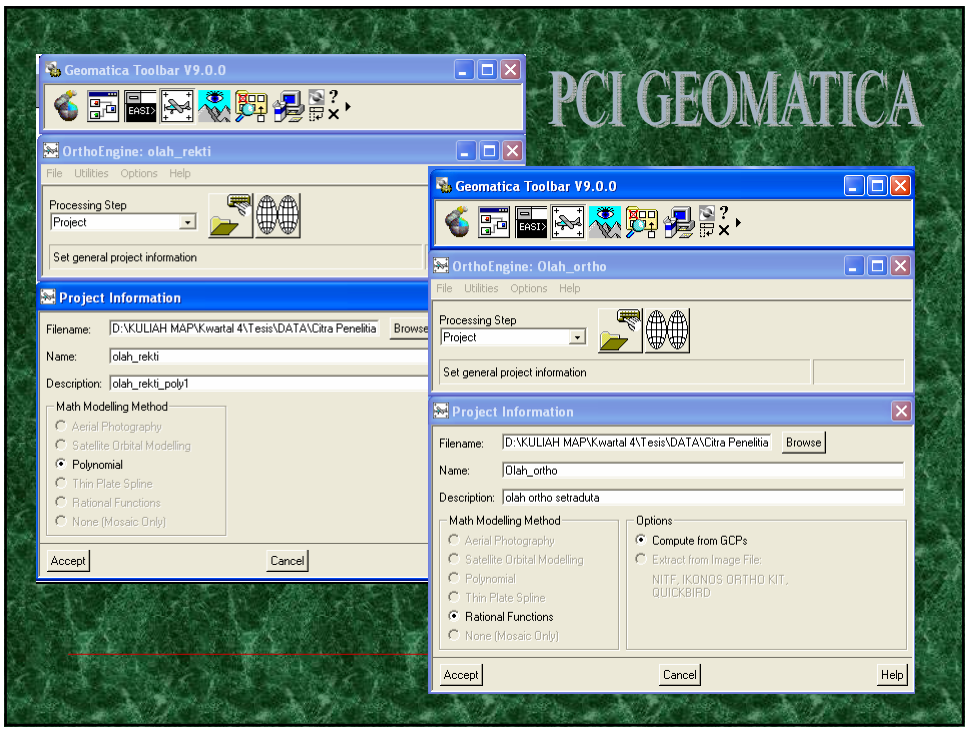
Real data



Tools

- **Quickbird image and DEM of research area.**
- **GPS survey by using *receiver* GPS (geodetic type) Trimble R5700, and Leica Distometre**
- **Supported software (Ms Office, Mapinfo, SKIpro, Trimble Geo Office, Autocad, PCI Geomatics, Adobe Photo Shop).**

Titik	Ortho		Rektifikasi		Residual	
Cek	X	Y	X	Y	Ortho	Rektifikasi
Titik 1	0.414	0.312	0.733	0.437	0.016	0.003
Titik 2	0.436	0.311	0.464	0.448	0.012	0.008
Titik 3	0.443	0.310	0.753	0.432	0.027	0.008
Titik 4	0.445	0.288	0.743	0.438	0.047	0.004
Titik 5	0.454	0.302	0.752	0.443	0.046	0.005
Titik 6	0.425	0.316	0.691	0.435	0.026	0.005
Titik 7	0.448	0.312	0.766	0.437	0.043	0.006
Titik 8	0.449	0.314	0.750	0.438	0.031	0.006
Titik 9	0.445	0.315	0.753	0.437	0.028	0.002
Titik 10	0.445	0.316	0.724	0.435	0.009	0.005
Titik 11	0.465	0.340	0.890	0.446	0.052	0.006
Titik 12	0.446	0.313	0.748	0.432	0.045	0.006
Titik 13	0.448	0.310	0.759	0.435	0.049	0.000
Titik 14	0.435	0.295	0.752	0.435	0.042	0.003
Titik 15	0.446	0.316	0.752	0.434	0.033	0.000
Titik 16	0.443	0.315	0.751	0.438	0.030	0.004
Titik 17	0.454	0.308	0.763	0.439	0.027	0.002
Titik 18	0.448	0.315	0.753	0.436	0.033	0.002
Titik 19	0.465	0.311	0.793	0.435	0.039	0.004
Titik 20	0.379	0.316	0.259	0.436	0.083	0.004
Titik 21	0.449	0.302	0.758	0.440	0.035	0.042
Titik 22	0.448	0.316	0.753	0.437	0.032	0.002
				Rata-rata	0.040	0.010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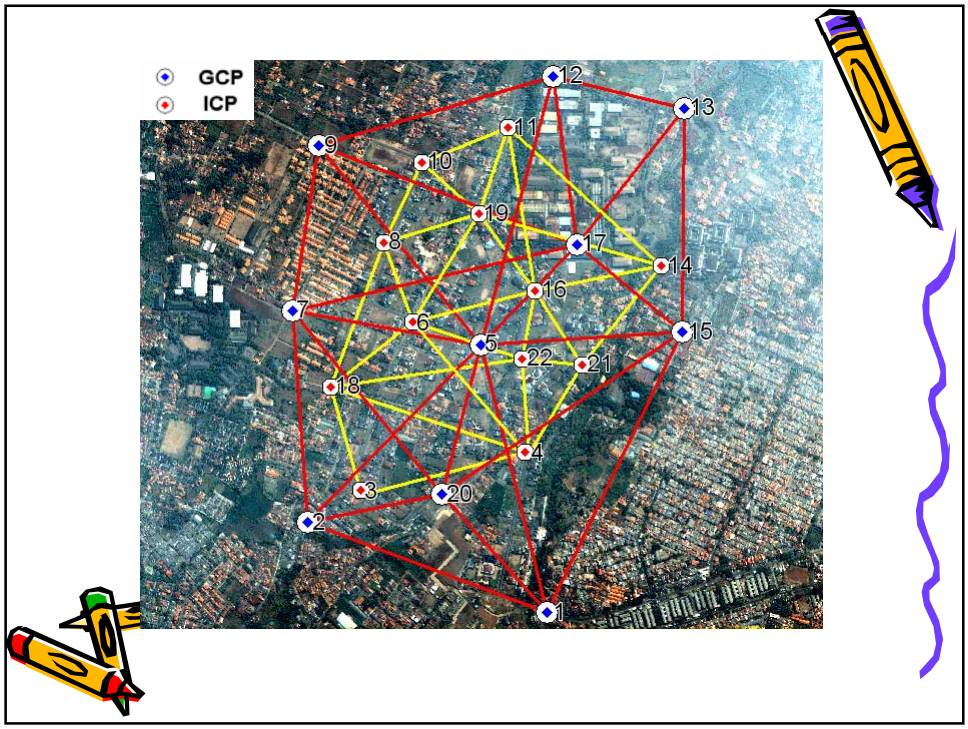
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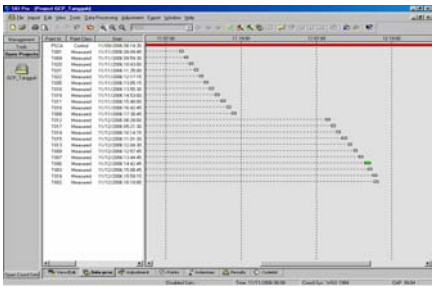

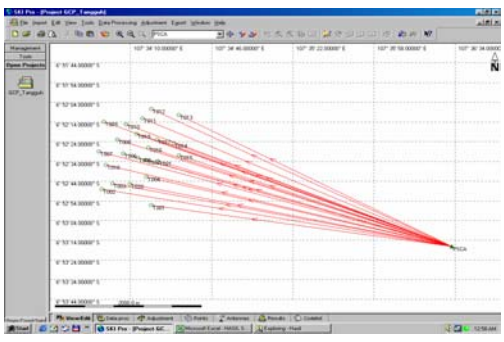

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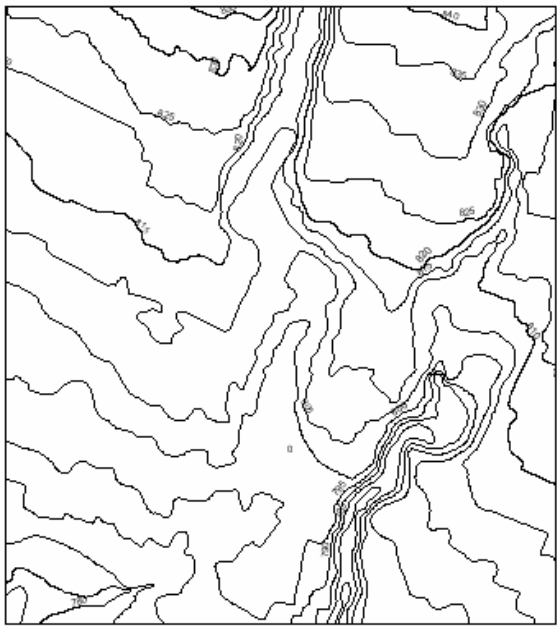

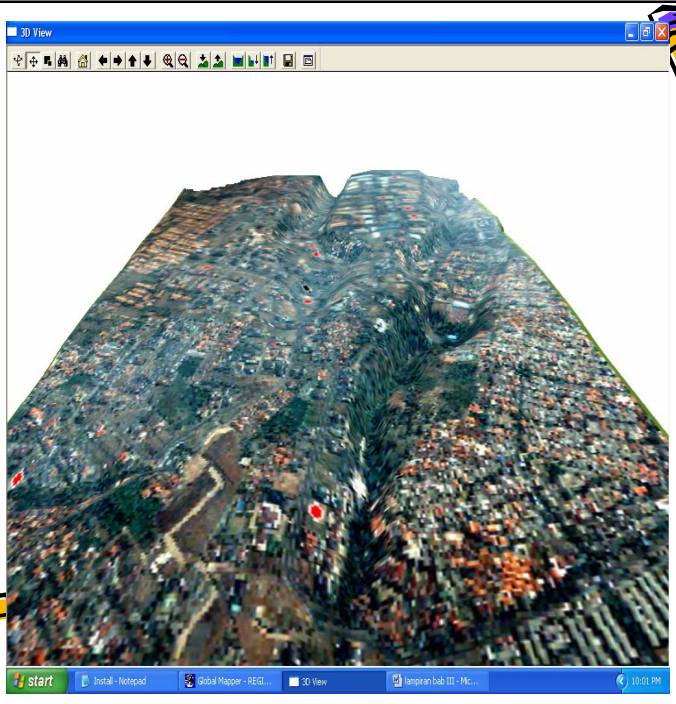
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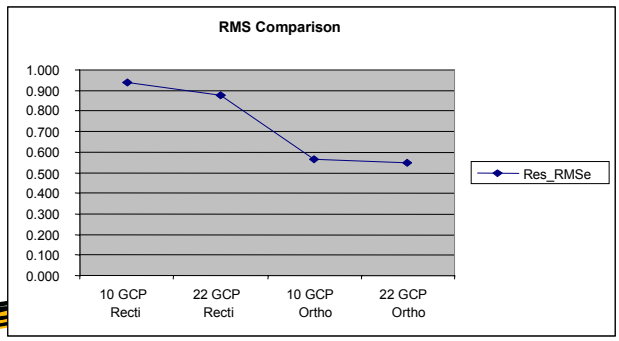
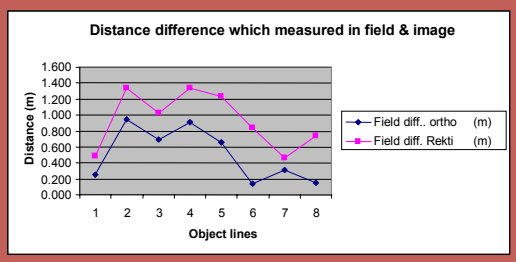
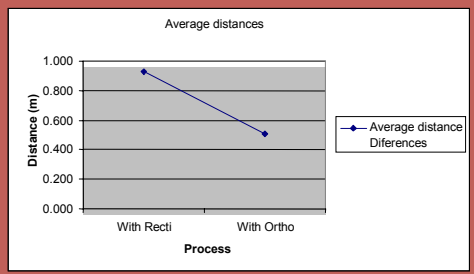
RESULTS

Remarks	Res_Std_Dev	Res_RMSe
10 GCP Recti	0.762	0.937
22 GCP Recti	0.671	0.876
10 GCP Ortho	0.563	0.564
22 GCP Ortho	0.436	0.546

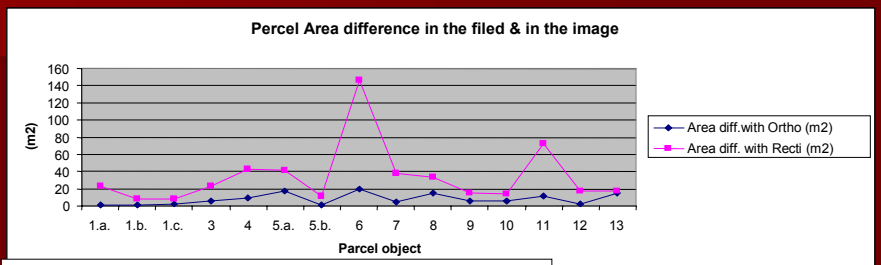


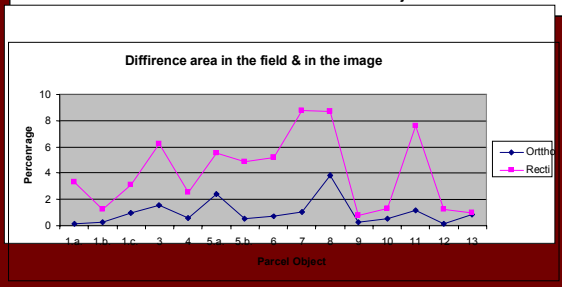
Comparison line objects in the field to digitized lines in the image

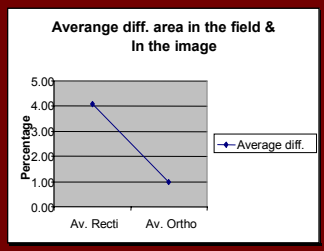




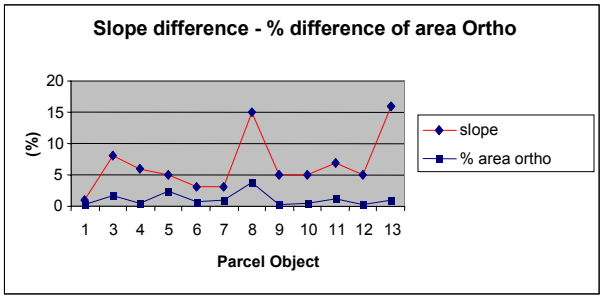
Land parcel area comparison in the field & in the image

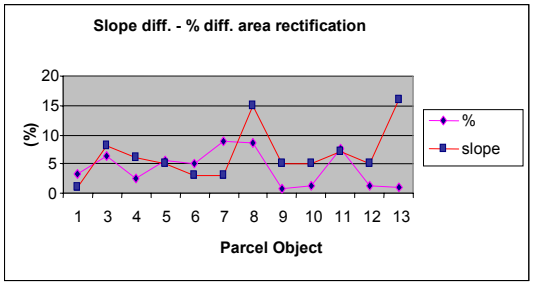


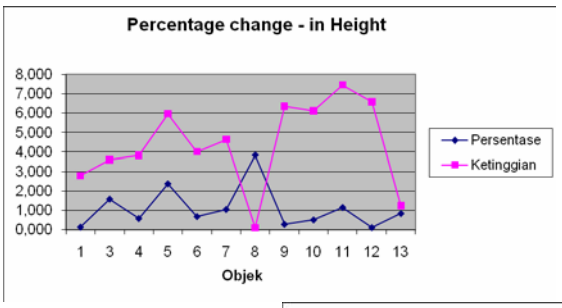




Slope influence to Land parcel area

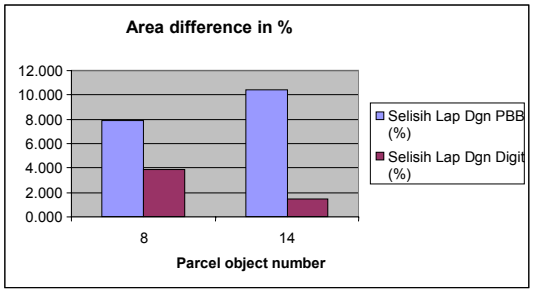






Spatial data comparison of PBB – DIGITASI - LAPANGAN

Keterangan	RMSe X	RMSe Y	RMSe
Data PBB	0.652	0.024	0.653
Citra Ortho	8.568	10.588	13.620



CONCLUSION

- Image processing of Quickbird in this research give the results of RMS Check Point to rectification 0.937 m for 10 GCP dan 0,876 m fork 22 GCP. While The image processing by ortorectification give RMS = 0.564 m for 10 GCP and 0.546 m for 22 GCP.
- The difference of average distance in the field and in the image after rectification = 0.931m. And also after orthorectification process = 0.507 m.
- The diffrence of average parcel area in the field and in the image after rectification process = 34.048 m2. and after orthorectification =7.826 m2.
- The percentage of parcel area in the filed and in the image is 4 % for rectified Image and 1 % for orthorectified image.
- The difference of parcel area in the filed and image is mostly influenced by the slope of the region.
- Finally, the conclusion of this research that the accuracy of position object improve from ±13.620 m to ±0.653 m. and for the parcel area accuracy improve from 9 % to 3 %
- The result of quickbird image map can be used as a basemap fot data updating in the taxation office di indonesia and also can be able to certify the position & parcel area of land to be taxed.

Recommendation

- The Geometric Correction is needed to improve the orthoproduct image and the use of DEM is also recommended.
- By this method, time and cost will be reduced while field measurement survey & ground truth still to be needed for tax object verification.

Thank you…